THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LXXXVII. No. 2158.] LONDON, SEPTEMBER 20, 1904. [56TH YEAR. PRICE 6d.

PARKER & LESTER,

— *ESTABLISHED 1830.* —

MANUFACTURERS AND CONTRACTORS, **ORMSIDE STREET, LONDON, S.E.**

THE ONLY MAKERS OF

PATENT ANTIMONY PAINT & PARKER'S IMPERIAL BLACK VARNISH.

OXIDE PAINTS, OILS, AND GENERAL STORES, FOR GAS AND WATER WORKS.

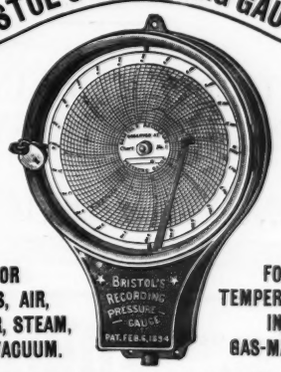
SAFETY GAS-MAIN STOPPER,

FOR SHUTTING OFF GAS IN MAINS TEMPORARILY DURING ALTERATIONS AND REPAIRS.

GAS-LEAK INDICATOR.

PRICES AND PARTICULARS ON APPLICATION.

BRISTOL'S RECORDING GAUGES



FOR GAS, AIR, WATER, STEAM, OR VACUUM.

FOR TEMPERATURE IN GAS-MAINS.

Many Thousands in Daily Operation.

J. W. & C. J. PHILLIPS,
23, COLLEGE HILL,
LONDON, E.C.

All Pipes marked

"S.A.V."

Telegrams: "AMOUR, LONDON."
Telephone Nos.: 1890 HOLBORN; CENTRAL 194.

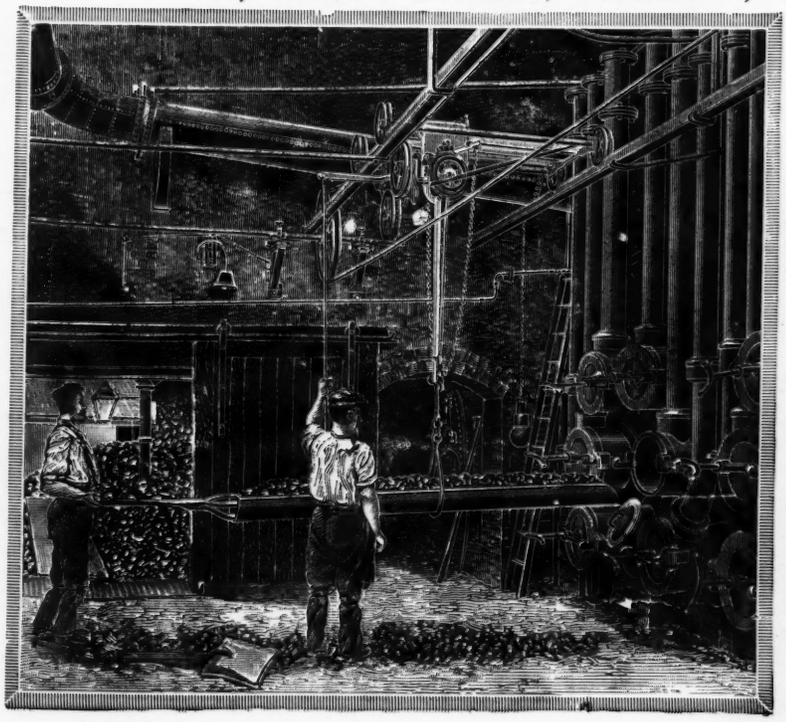
VERTICALLY CAST IRON PIPES.

The only Foundry in Europe casting Pipes under Clarifying Process.

A. G. CLOAKE,
54, HOLBORN VIADUCT, LONDON, E.C.

BIGGS, WALL, & CO.,

13, CROSS STREET, FINSBURY, LONDON, E.C.



Telegrams: "RAGOUT, LONDON."
Telephone: 273 CENTRAL.

"RAPID"
MANUAL & POWER
CHARGING APPARATUS,
FOR GAS-WORKS OF ALL SIZES.

Repeat Orders
YEOVIL, NEWPORT, SOUTHBANK, WORTHING, ALDERSHOT.

Machines can be seen working at any of the following Works:—

ALDERSHOT	WREXHAM
WORTHING	SWINDON
YEOVIL	EPSOM
TRURO	SHETTLESTON
NORMANTON	DUBLIN
OTLEY	G. S. & W. Rly. Works
GOOLE	NEWPORT, MON.

1000 CANDLE POWER AT 1d. PER HOUR.

The Cheapest, Cleanest, and most Efficient Light upon the Market.

It is particularly adapted for Engineering Works, Foundries, Breweries, Dye Works, Collieries, Brick Works, and all large Shops and Spaces.

Will save 50 per cent. on Lighting Bill where either Electric Light or Gas are in use.

Installations of from 500-Candle Power to any amount can be erected in one to four weeks according to size.

Write to-day for Particulars to

THE UNITED KINGDOM LIGHTING TRUST, Ltd.,
DEPT. B.
99, CANNON STREET, LONDON, E.C.

4 ft. 6 in. high by 18 in. wide.

Oil Reservoir and Pump.

The following well-known Firms are users of the System—

J. H. ANDREW & CO., Ltd., Sheffield.
Sir W. G. ARMSTRONG, WHITWORTH, & CO., Ltd., Manchester.
H. BESSEMER & CO., Ltd., Sheffield.
CRAMLINGTON COLLIERY CO., Ltd., Northumberland.
CHARLES CAMMELL & CO., Ltd., Sheffield.
HAMSTEELS COLLIERY CO., Ltd., Durham.
HUNSLET ENGINE CO., Ltd., Leeds.
SMITH & COVENTRY, Ltd., Salford, Manchester.

30 in. high, by 19 in. wide.

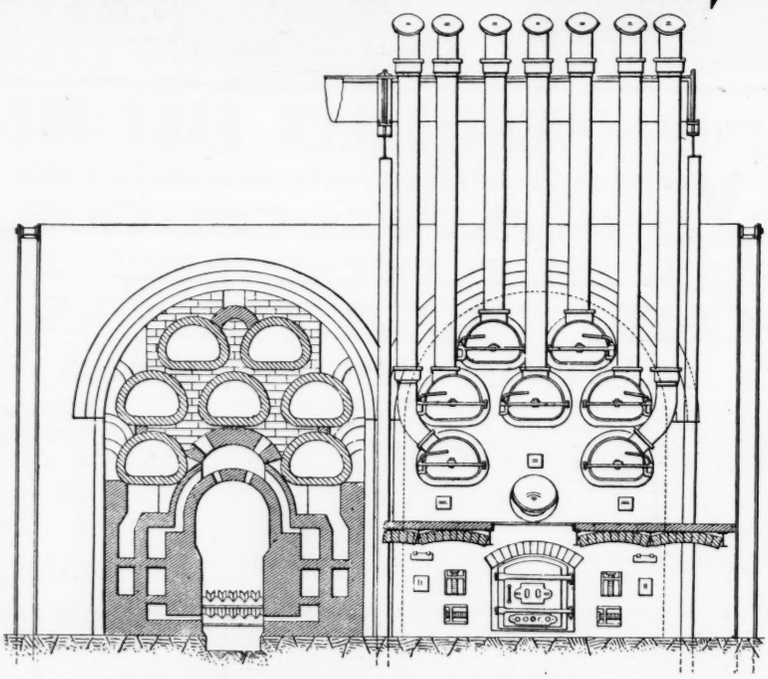
Hanging Lamp, 1000-c.p.

Telegrams—"Cockeys Frome."

EDWARD COCKEY & SONS, Ld.

Telephone No. 16.

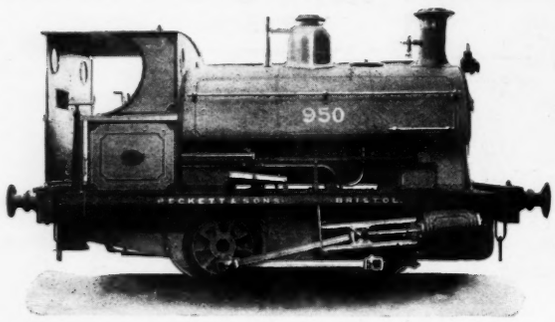
BALE AND HARDY'S SPECIAL GENERATOR AND REGENERATOR SETTINGS.



GIVING THE BEST KNOWN RESULTS WITH REGARD TO HEATS & ECONOMY IN FUEL.

ESTIMATES AND FULL PARTICULARS ON APPLICATION.

THE IRON WORKS, FROME, SOMERSET.



LOCOMOTIVES

LOCOMOTIVES of all Sizes and Gauges specially constructed for Main and Branch Lines, Contractors, Docks, Gas-Works, Collieries, Iron-Works, Brick and Cement Works, &c. Locomotives of various Sizes always in Stock, ready for immediate Delivery.

Photographs, Specifications, and Prices on Application.

PECKETT & SONS, Atlas Locomotive Works, BRISTOL.

Telegraphic Address: "PECKETT, BRISTOL."

THE BARROWFIELD IRON-WORKS, LTD.,

GAS ENGINEERS AND CONTRACTORS,

GLASGOW.

Telegrams:
"GASOMETER, GLASGOW."

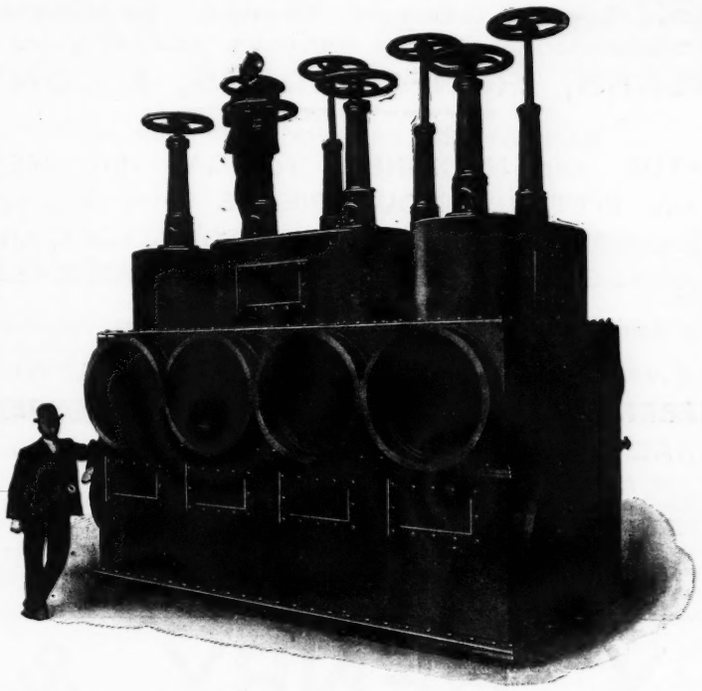
OIL PLANT AND CHEMICAL APPARATUS.

BRIDGES, GIRDERS, WHARVES, PIERS.

ROOFING OF EVERY STYLE.

PIPES, VALVES, AND CONNECTIONS.

London Office:
6, LITTLE BUSH LANE, CANNON STREET, E.C.



Weck's Centre-Valve for 30-inch Connections for GRANTON GAS-WORKS of the EDINBURGH and LEITH CORPORATIONS GAS COMMISSIONERS.

GAS APPARATUS OF EVERY DESCRIPTION.

RETORTS, CONDENSERS, SCRUBBERS, PURIFIERS

GASHOLDERS AND TANKS.

ENGINES, EXHAUSTERS, STEAM-BOILERS, AND FITTINGS.

GEORGE ORME & CO. (Branch of Meters Ltd.)

ATLAS METER WORKS,

PARK STREET, OLDHAM.

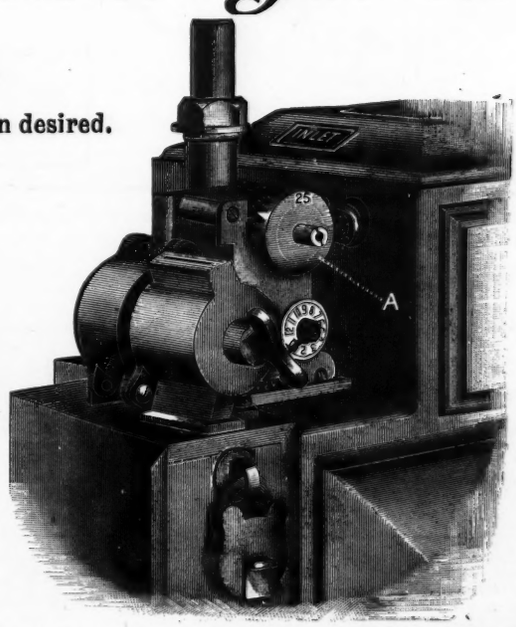
Tel. Address: "ORME OLDHAM."
Telephone No. 93 Oldham.

"NEW CENTURY" PATTERN

Patent Coin *Prepayment Gas-Meters*

Fitted with Detachable Attachments.

Arranged for 1d., 1s., or any other Coin desired.



Change of Price effected by simply removing Crown Wheel "A" and replacing same with another Wheel.

ANY FURTHER PARTICULARS WILL BE SUPPLIED UPON APPLICATION.

NEWTON, CHAMBERS, & CO.,

LIMITED,

THORNCLIFFE IRON-WORKS, NEAR SHEFFIELD.

Established 1790

LONDON OFFICE: 19, Great George Street, WESTMINSTER.

Telegraphic Addresses: "NEWTON, SHEFFIELD," "ACCOLADE, LONDON."

GAS ENGINEERS, IRONFOUNDERS, & CONTRACTORS.

MANUFACTURERS OF EVERY DESCRIPTION OF

PLANT, APPARATUS, AND MACHINERY FOR GAS AND CHEMICAL WORKS.
RETORTS AND FITTINGS, MOUTHPIECES WITH SELF-SEALING LIDS.
IMPROVED COAL AND COKE HANDLING PLANT, CONVEYORS, AND ELEVATORS.
CONDENSERS, SCRUBBERS, AND WASHERS.

PURIFIERS with Planed Joints a Speciality.

PATENT CENTRE-VALVES, RACK AND SCREW VALVES, WOOD GRIDS AND SCRUBBER-BOARDS, CAST-IRON MAINS, AND SPECIALS.
STRUCTURAL WORK, COLUMNS, GIRDERS, AND ROOFING.
GASHOLDERS, CAST-IRON OR STEEL TANKS.

DESIGNS, SPECIFICATIONS, and ESTIMATES FREE.

PIG IRON (SPECIAL QUALITY) for Engine Cylinders. GAS COAL famous for its unrivalled excellence.

BARRY, HENRY, & CO.,

— LIMITED. —

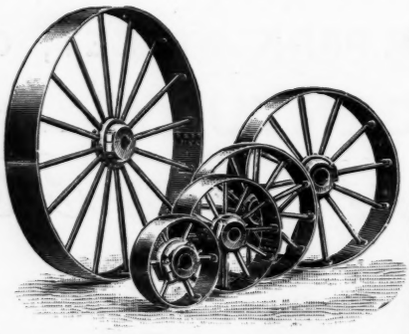
Specialities:

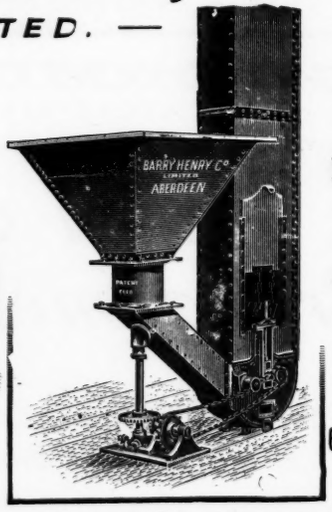
TRANSMISSION OF POWER.

Rope & Belt Pulleys,
Spur & Bevel Wheels,
Shafting & Couplings,
Pedestals, & Fixings.

WORKS:

ABERDEEN, SCOTLAND.





Specialities:

TRANSMISSION OF MATERIALS.

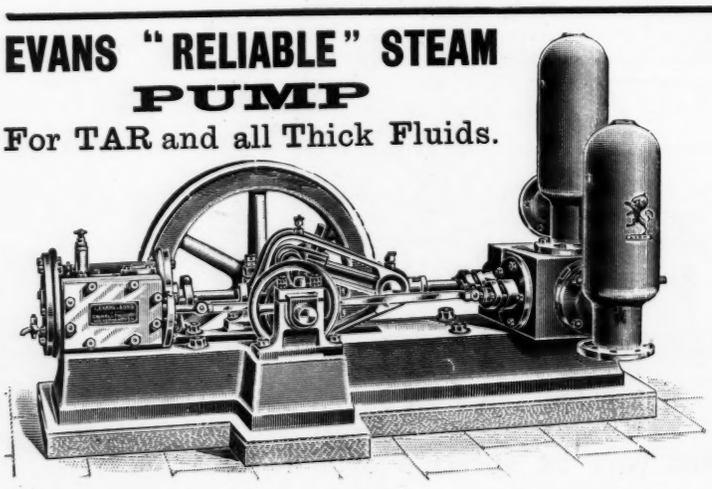
Conveyors,
Elevators,
Grinding Machinery,
Motors.

AND

64, MARK LANE, LONDON, E.C.

EVANS "RELIABLE" STEAM PUMP

For TAR and all Thick Fluids.



FIRST AWARDS EVERYWHERE.

Write for No. 8 Catalogue.

Telegrams:
"EVANS," WOLVERHAMPTON.
National Telephone No. 39.
London Office,
SALISBURY HOUSE, LONDON WALL, E.C.

JOSEPH EVANS & SONS,

CULWELL WORKS,
WOLVERHAMPTON.

THE WELSBACH KERN SELF-INTENSIFYING SYSTEM.

No. 604.

No. 35a

The name **Welsbach** is our guarantee of quality, and a protection against disappointing results.

35a **SHADOWLESS LANTERN** (**800** in use in **NEWCASTLE-ON-TYNE**)
604 **SUSPENSION S.I. LAMP** (Interior Lighting). Enamelled throughout—
No Paint used.

Both Lamps are produced in three sizes, giving about
150 Candle Power for 5 feet of Gas per hour.
300 ,, ,, ,, 10 ,, ,, ,, ,,
600 ,, ,, ,, 20 ,, ,, ,, ,,

Write for Catalogue of New Patterns.

THE WELSBACH INCANDESCENT GAS-LIGHT CO., LTD.
14, PALMER STREET, WESTMINSTER, S.W.
Telegrams: "Welsbach, London. Telephone: 290 Westminster.

THIS TALKS!!!

We have Lighted a Section of Plymouth Docks
for the Great Western Railway Company,

An Extension has been Ordered. .

We have completed at Aylesbury an Installation—Town Hall, Market, &c. .

The Council has unanimously decided that we be requested to do the whole of the Public Lighting.

We are

50	per cent. Cheaper than	Incandescent Gas.
70	,,	Electric Arc.
80	,,	,, Incandescent.
120	,,	Ordinary Fishtail.

BERLIN, the Finest Lighted City in the World, **has adopted Millennium**

It is the **LAST WORD.**

THE MILLENNIUM SYSTEM IS A METHOD OF COMPRESSING ORDINARY GAS. . . . .

If you want to get MORE LIGHT and CUT THE COST, write—

The British Compressed Gas Co., Ld.,

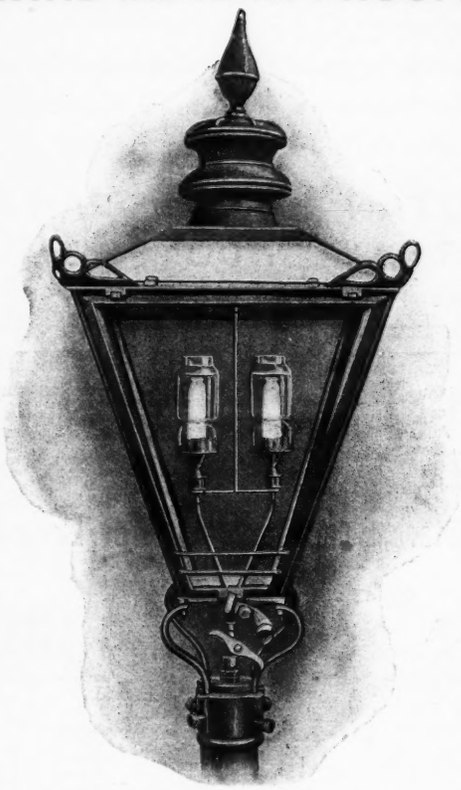
57, BARBICAN, E.C.

BRAY'S "BAGBY" LANTERNS

For Incandescent Street Lighting.

ALL COPPER.

WIND AND RAIN PROOF.



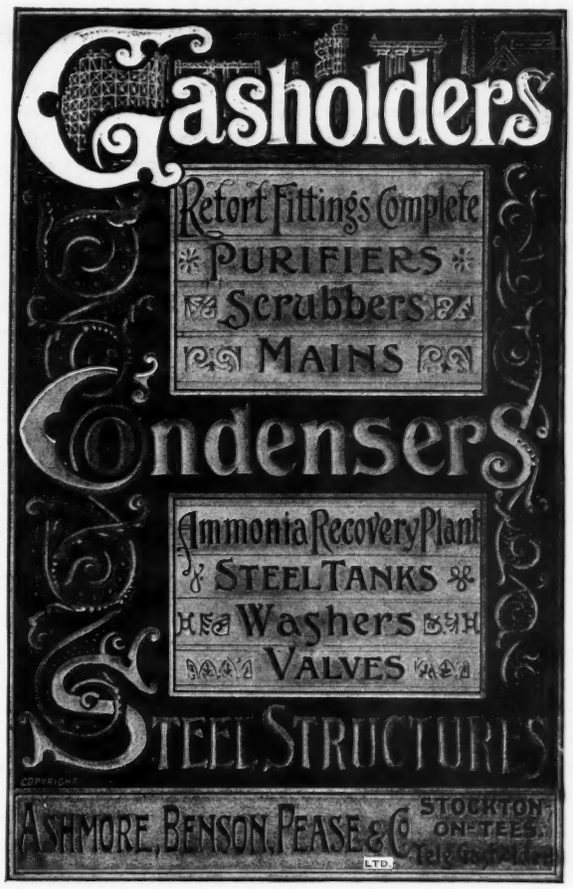
BRAY'S No. 2 "BAGBY" LANTERN.

Enamelled Earthenware Reflector, "Bray" C. Burners and Anti-Vibrating Frame.

These Lanterns are made in several Designs and Sizes.

New Season's Catalogue ready shortly.

GEO. BRAY & CO., LTD.,
GAS LIGHTING ENGINEERS,
BAGBY WORKS, LEEDS.



"GLASMI"

Used by Gas Companies and Corporations everywhere.

Specially recommended for
STREET LIGHTING.

Made for any Burner on the Market.

Send for Samples and Prices.

MANTLES.

J. & W. B. SMITH,
19 to 23, Farringdon Road,
LONDON, E.C.

KIRKHAM, HULETT, & CHANDLER, LIMITED,

PATENT "STANDARD" WASHER-SCRUBBERS
(Improved Design with Isolated Bearings).

PATENT "STANDARD" CONDENSERS.

PATENT "STANDARD" TAR-WASHERS.

PATENT "STANDARD" PURIFYING GRIDS.

Palace Chambers, Bridge Street, Westminster, S.W.

Telegraphic Address: "WASHER, LONDON." Telephone No. 127 VICTORIA.

COAL TAR PRODUCTS.

Benzol, Toluol, Solvent Naphtha, Creosote Oils, Grease Oils, Carbolic Acid, Crude Creosote Salts, Granulated (Crude) Naphthalene, Sublimed Naphthalene, Anthracene, Refined Tar, Pitch, also Sulphate of Ammonia.

For Prices apply to the **SOUTH METROPOLITAN GAS COMPANY,**

Works: ORDNANCE WHARF, EAST GREENWICH, LONDON, S.E.

709, OLD KENT ROAD, LONDON, S.E.

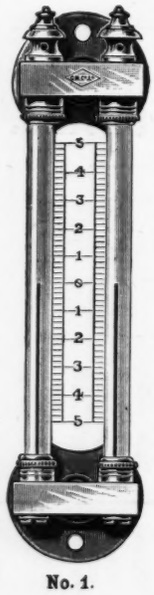
Telegraphic Address: "METROGAS, LONDON."

THE GAS-METER CO., LTD.,

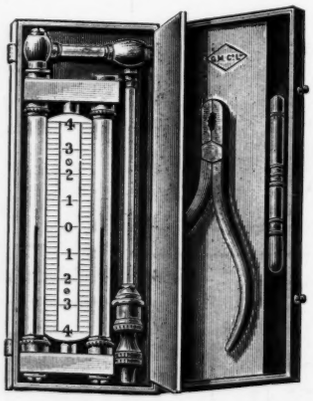
Manufacturers of

Wet & Dry Gas-Meters, Automatic Meters, Station Meters, Governors, Main Taps, Lamp Taps.

GAUGES, &c.



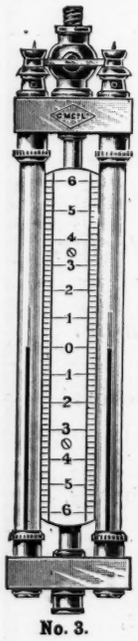
No. 1.



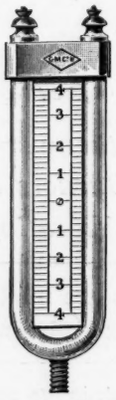
Inspector's Pocket Gauge.

Telephone Nos:
142 Dalston (Nat.), 340 Oldham (Nat.),
1995 Dublin (Nat.), 2918 Manchester (Nat.).

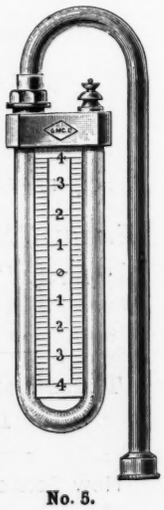
For Prices and Particulars apply:



No. 3.



No. 4.



No. 5.

Telegraphic Addresses:
"METER LONDON," "METER OLDHAM,"
"METER DUBLIN," "METER MANCHESTER"

Works: 238, Kingsland Road, LONDON; Union Street, OLDHAM; Hanover Street, DUBLIN.

PUBLIC OPINION

OF THE

"Acme"

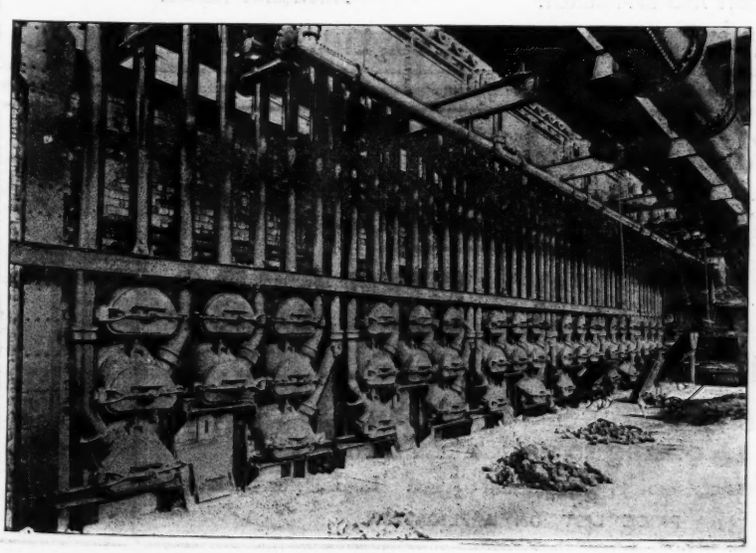
PERFECTION.

ARDEN HILL & CO.,
"ACME" WORKS,
BIRMINGHAM.

INSTALLATIONS OF INCLINED RETORTS COMPLETE.

DRAKES LTD.

HALIFAX. *Telegrams:* "DRAKESON, HALIFAX." *Telephone:* "No. 43 HALIFAX." COAL AND COKE



BREAKING,
ELEVATING,
CONVEYING,
SCREENING,
PLANTS.

LONDON:
181, QUEEN VICTORIA ST., E.C.
NEW YORK:
395, BROADWAY.

HENRY BALFOUR & CO.

LIMITED,

LEVEN, FIFESHIRE.

Contractors for the Supply and Erection of all Classes of

Gas-Works Plant.

THE "ANNULAR" BRUSH WASHER-SCRUBBER

(CREEKE'S PATENT).

Made with Cast-Iron or Mild Steel Cylinders.

PRICES AND PARTICULARS ON APPLICATION.

London Representative: MR. HENRY PUPLETT, 47, VICTORIA STREET, S.W.

Prices from **21s. 6d.**
WE HOLD THE STOCK.

DO YOU KNOW

2

THE EXCEPTIONAL MERITS OF THIS STOVE?

THE **"OMEGA"**

IS AN ODOURLESS GAS HEATER AND A RAPID HOT AIR CIRCULATOR.

SIX YEARS' TEST. THOUSANDS SOLD.

A MARVEL OF ECONOMY AND EFFICIENCY.

PRICE LIST READY.

THE "OMEGA" ODOURLESS GAS STOVE CO., LTD., WILDER ST., BRISTOL.

GENERAL HEATING & LIGHTING CO., LTD.,

(MOELLER'S SYSTEM),

26, VICTORIA STREET, LONDON, S.W.

MOELLER'S BURNERS

MAINTENANCE SIMPLIFIED.

Nothing to Corrode. Nothing to Choke.
Nothing to get out of Order.

Made in 4 Sizes consuming, 3, 4, 4½, and 6½ feet. In Brass or Nickelled.

PRICE LIST ON APPLICATION.

CONTENTS.

EDITORIAL NOTES.

GAS, &c.—

The New Provan Gas-Works 785
Chief Engineership of the Gaslight and Coke Company 786
Local Authorities Abandoning Gas-Works Purchase 786
Gas Provisional Orders of the Session—An Acetylene Scheme 787
An Improved Position at Halifax, and the Price of Gas—The Fees of Arbitrators . . 878

ESSAYS AND REVIEWS.

The Enterprise of the Wellingborough Gas Company—Completion of the New Works. 789
Gas Stock and Share Market 800
Electric Lighting Memoranda 800
Municipal Borrowing and Its Effect . . . 801
The Provan Gas-Works of the Glasgow Corporation—Second Article 805

COMMUNICATED ARTICLE.

Low Lighting Power and Minimum Purification. By H. Leicester Greville, F.I.C., F.C.S., &c. 801

TECHNICAL RECORD.

The Consumption of Air by Incandescent Gas-Burners 803
The Hinman Station Meter 804
The "Liais" Inverted Incandescent Burner. 814
Lamps for Outdoor Use 815

REGISTER OF PATENTS.

Gas Cooking-Stoves with Circulating Hot-Water Supply—Sheppard, W. D. . . . 815
Gas-Burners for Incandescent Lighting—Moeller, J. 815
Gas-Burners for Incandescent Lighting—Moeller, J. 816
Suspending Incandescent Bodies for Illuminating Purposes—Kramer, E. 816
Mantles for Incandescent Lighting—Dewey, H. 816
Internal Combustion Engines—Fairweather, W. (Waite Gas-Engine Company) . . . 816
Suction Gas Plant—Hillenbrand, J. 816
Connecting Branch Pipes to Mains under Pressure—Ham, F. G. S. 816
Retort-Charging Machine—Bollé, C. (Eitle, C.) 817
Patent Notices 817

MISCELLANEOUS NEWS.

The Proceedings at the Inauguration of the Provan Gas-Works, Glasgow 811
Gas and Water Orders of the Past Session . 818
Rickmansworth District Council and the Gas-Works—Proposal to Withdraw from the Purchase 819
Bishop's Stortford Council and the Gas-Works—Rejection of the Proposal to Purchase 819
Gas Purchase Question at Otley 820
Ottoman Gas Company, Limited 820
Gas Matters in Halifax—The Past Year's Working; Reduction in Price 821
Glasgow Corporation Gas Supply 822
Primitiva Gas and Electric Lighting Company 823
Incandescent Gas Lighting for Southwark . 823
An Electric Light Scheme not Entertained . 823
Disappointing Electricity at Dudley . . . 823
Strike at Messrs. Graham, Morton, and Co.'s 824
Notes from Scotland 825

MISCELLANEOUS NEWS (*continued*)—

Current Sales of Gas Products 828
Coal Trade Reports 828
Stock and Share List 833

PARAGRAPHS.

Masonic 800
The Manchester and District Junior Gas Association—International Exhibition at Liège—Society of Chemical Industry—A Gigantic Pumping-Station—Eastern Counties Gas Managers' Association. 804
The Royston Gas Company and the Lighting of Ryhill—Aldeburgh in Darkness . . . 814
Selby Water Scheme—The Parliamentary Powers of the Tees Valley Water Board . 821
Suicide by Gas in Glasgow—Heavy Leakage of Gas at Padham 824
Sale of Shares 827
Guildford and the Woking Water Company—The Lighting of Ormskirk Workhouse—The South Suburban Gas Company and the Pollution of the Ravensbourne—Borrowing Powers at Southport—Cost of Arc Lighting in London 829
Ledbury District Council and the Gas-Works—Commencement of the Geltsdale Water Scheme for Carlisle—Workmen's Compensation—Incandescent Gas Lighting at Bath—Fatal Accident at the Swansea Gas-Works—Braintree Water Supply—District Councils and the Levying of Rates 830
Suffocation by Gas at Brighton—New Colliery Workings in Lancashire—Lighting the New Vauxhall Bridge Approach—New Joint-Stock Companies—Nantwich Water Supply—Gas Supply at the Antipodes—Fraudulent Consumption of Gas 831
Sulphur in Coal—Incandescent Gas Lighting on the Continent 832

Messrs. HUMPHREYS & GLASGOW

AND

THE UNITED GAS IMPROVEMENT CO., U.S.A.

CARBURETTED-WATER-GAS PLANT

— *DOUBLE-SUPERHEATER SYSTEM.* —

H. & G., LONDON **151,000,000** Cu. Ft. Daily

U. G. I. CO., U.S.A. **429,700,000** Cu. Ft. Daily

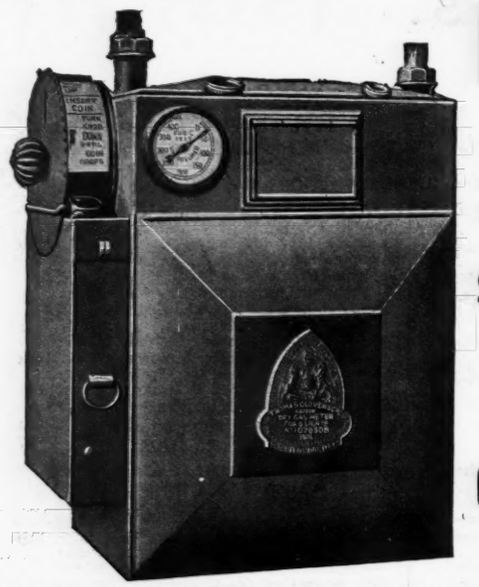
TOTAL 580,700,000 Cu. Ft. Daily

Messrs. HUMPHREYS & GLASGOW,
38, Victoria Street, London, S.W.
31, Nassau Street, New York.

THE UNITED GAS IMPROVEMENT COMPANY,
Philadelphia.

Telegrams { "EPISTOLARY, LONDON."
"HUMGLAS, NEW YORK."

THOMAS GLOVER & CO.'S



PATENT NEW IMPROVED PREPAYMENT METER

For Pennies, Shillings, or any Coin.

Simple in Mechanism.
Positive in Results.
Price Changer *in Situ.*

GUARANTEED FOR FIVE YEARS.

Telegraphic Address: "GOTHIC, LONDON." Telephone No. 6159 Bank.

THOMAS GLOVER & CO., LTD.,

GAS-METER MANUFACTURERS,

LATE OF CLERKENWELL, NOW 49, QUEEN VICTORIA STREET.

Telegraphic Address: "GOTHIC, LONDON." Telephone No. 6159 Bank.

BRISTOL:	BIRMINGHAM:	MANCHESTER:	GLASGOW:	BELFAST:	MELBOURNE:
28, BATH STREET. *Telegraphic Address:* "GOTHIC." Telephone No. 1003.	57 & 58, BROAD STREET. *Telegraphic Address:* "GOTHIC"	132 & 134, CORN EXCHANGE BUILDINGS. *Telegraphic Address:* "GOTHIC." Telephone No. 3398.	26, WEST NILE STREET. *Telegraphic Address:* "GASMAIN." Telephone No. 6107 Royal.	8, EXCHANGE PLACE, DONEGALL STREET. *Telegraphic Address:* "GOTHIC."	23, WRIGHT'S LANE, LONSDALE STREET, Telephone No. 3716.

PARKINSON'S

DRY METERS

ALL SIZES KEPT IN STOCK.

PARKINSON AND W. & B. COWAN, LTD.
(*Parkinson Branch*).

COTTAGE LANE, CITY ROAD, LONDON. | BELL BARN ROAD, BIRMINGHAM.

JOURNAL OF GAS LIGHTING, WATER SUPPLY, &c.

EDITOR & PUBLISHER: WALTER KING. OFFICE: 11, BOLT COURT, FLEET ST., LONDON.

VOL. LXXXVII., No. 2158.—TUESDAY, SEPTEMBER 20, 1904.

EDITORIAL NOTES—GAS, &c.

The New Provan Gas-Works.

THE formal opening of the new Provan Gas-Works at Glasgow last Wednesday (a full report of which appears elsewhere) was an event of no ordinary importance in the history of the gas industry. It indicates in the most unmistakeable manner possible the high appreciation in which gas is held in what has been described, not without a considerable amount of justification, as the best-governed city of the Empire. It is to keep pace with a demand which was almost doubled during the last complete decennial period—and which continues to increase rapidly, notwithstanding the vicissitudes of trade and competition with electricity also supplied by the Corporation—that this gigantic extension of the gas undertaking has been conceived and, so far as is at present necessary, carried out. In the opening article of our description published last week, as well as in the admirably illustrated souvenir prepared for the occasion, it is related how, several years ago, it became evident to the Gas Committee that new works were a necessity. It fell to the late Mr. William Foulis to select a suitable site for them. This was by no means an easy task, having regard to the large area required, the conditions involved, and, it may be added, the increasing sensitiveness of populations to the proximity of gas-works. How satisfactorily he fulfilled it, all who were present at the opening ceremony can bear witness. They saw a site the natural advantages of which have been utilized with the utmost skill. And what must have struck every one as being perhaps the most notable feature of the works is the arrangement of railway communications at two different levels—at a high level on one side, by which coal, lime, &c., are brought into the works; and at a low level on the other side, conveniently adapted for the sending out of coke and other residuals. The fullest advantage has thus been taken of the varying levels of the ground, which lend themselves to such an arrangement. The value of the latter, in its bearing upon the cost of transport of material, can hardly be over-estimated. It is such adaptation of natural features to the end in view which displays the skill of the engineer, and upon which the success of any enterprise of this kind so greatly depends. In this case, it must be apparent to all observers that success is assured. Opinions may differ as to whether the greatest benefit has been taken of the difference of level between the upper and lower portions of the works, so as to minimize the use of mechanical means of transport; but valuable experience on this point will have been gained before the works require to be extended, and full advantage of this will doubtless be taken by the adoption of any modification of the present design that may appear desirable. The works are planned to consist eventually of four sections; and each section will be capable of producing 12 million cubic feet of gas, or 48 millions in all. They are, therefore, destined in all probability to rank as one of the largest Provincial gas-works. The first section has already been completed, and is partly in use.

Perhaps the greatest interest in the retort-house centres in the settings of twelve retorts heated by outside producers. This arrangement was tried with success at the Dawsholm works a few years ago, and was in operation at the time of the Engineering Conference in connection with the Glasgow Exhibition of 1901. Carburetted water gas is conspicuous by its absence, as the late Mr. Foulis was no believer in it. He found from experience that he could enrich with oil more economically, by gasifying the oil at suitable temperatures; and the fact of the Corporation being able to supply 20 to 21 candle gas at 2s. 1d. per 1000 cubic feet (which is the present price) bears eloquent testimony to the soundness of his judgment. Nor was he any believer in the maintenance of a high illuminating power. It was through his instrumentality that the standard in Glasgow was reduced some years ago from 25 to 20 candles, and likewise that the Corporation recently obtained powers for a still further reduction to 16 candles. His views on both these points—namely, the uneconomical aspect of carburetted water gas manufacture, and the inutility of high illuminating power—are evidently shared by his able successor, Mr. Alexander Wilson. At all events, the same system of enrichment has been installed at Provan as is in use at the other works of the Corporation; but its early abandonment is foreshadowed by the building which contains the plant being constructed of a temporary character—for the reason, as explained in the description of the works, "that the Corporation may, in the near future, "take advantage of their existing statutory authority to "reduce the present high standard quality of the gas supply, "and supply the same at a lower illuminating power."

The whole of the works, including the Residual Products Works, in which it is intended to deal with the ammoniacal liquor and tar, are in accordance with the designs of the late Mr. Foulis; and it is a matter of profound regret that he was not spared to see the fruition of his genius. An eloquent and well-deserved tribute to his memory was paid by the Lord Provost at the banquet which followed the opening; and other speakers who succeeded him were not less solicitous of bearing testimony to the great value and disinterestedness of Mr. Foulis's public services. Indeed, if the remark may be made without appearing to be in the slightest degree ungracious, "Cæsar living was as naught "to Cæsar dead." The great services that were rendered by Mr. Foulis to Glasgow were deserving of more substantial recognition than was ever accorded to him; and for such omission no words can now make full amends. Those, however, whom he has left behind may dwell with satisfaction and with pride upon the public recognition that has been thus accorded him, and upon the universal testimony that the Provan Gas-Works will be an enduring monument to his skill and ability, and, we would also add, to his soundness of judgment. It was a graceful act of the Lord Provost to number among his guests the only son of Mr. Foulis, who was thus a witness to, and a participator in, the honour done to his father's memory.

One regrettable incident marred an otherwise completely successful and enjoyable day. We refer to the presentations made by the representatives of the Contractors to various members of the Corporation. Three representatives were called upon to respond to the toast of "The Con- "tractors," and each, in turn, presented his offering—Mr. M'Alpine to the Lord Provost; Mr. Laidlaw to the Convener of the Gas Committee; and Mr. Biggart to two other prominent members of the Committee. Had the Lord Provost and the Convener of the Gas Committee performed the opening ceremony with a golden key, or something of that description, not a word could have been said, because such things serve as mementoes of important occasions. But how are the lofty sentiments uttered by the Lord Provost with regard to the high honour of municipal service, and the intense devotion to the public weal which underlies this service, to be reconciled with the distribution of the gifts which followed? These were: A silver fruit service for the Lord Provost; three silver salvers for Preceptor Mitchell; two silver bowls for Councillor Calderwood, and silver candelabra for Councillor Willock. If prominent members of the Corporation are not above receiving gifts of such substantial value, in what position are they to object if any servant of the Corporation does likewise? It is not for a moment suggested that these presents were made from any corrupt motive, or that they were intended to be otherwise than purely complimentary. But it is an example in morals that ought not to be set by any member of any Corporation, for it may be too easily construed by those who serve them into license for wrong-doing. We mention this matter with the greatest reluctance, and only from a sense—unpleasant as it is—of public duty.

The Chief Engineership of the Gaslight and Coke Company.

A RETIREMENT long anticipated has at length become a certainty. At the close of this month, Mr. George Careless Trewby will throw off the responsibilities of the eminent office that he has for so long held in the Gaslight and Coke Company. It is now within four weeks of an equal number of years that we announced what was then expected by all—even by Mr. Trewby himself—to be his imminent resignation. Only the date had then to be determined; but that was the most difficult matter of all, inasmuch as it was subject to the selection of a suitable successor. When giving an account of Mr. Trewby's life-work in the "JOURNAL" for November 27, 1900, it was stated: "No precise date has "been fixed for Mr. Trewby's retirement. This will depend "entirely upon the arrangements made for carrying on the "work upon which he is at present engaged. The position "is one for which few are eligible; and the Directors have "before them in the appointment of a successor a very "responsible task." It was not only a responsible, but it proved to be for the time being an insuperable, task. That it should have been so, is, while it has in other respects its significance, a distinct tribute to Mr. Trewby. Certain engineers it was known were approached, and the names of others were linked with rumours as having been consulted, with the view of succeeding to the office; but the Directors could not fix their man for various reasons, one of which was that the post was not one that then held out sufficient attractions for those most competent to fill it to relinquish the offices held by them.

Now that the date of Mr. Trewby's retirement has been definitely arranged, the question of his possible successor will again be that of the hour in the gas profession. At the time of writing, there has been no public official declaration on the matter; and we have no knowledge other than that open to everybody as to the intentions of the Board. Naturally, however, the eyes of the profession will turn at once on Mr. T. Goulden, who was transferred from the Resident Engineership of Beckton to Horseferry Road to assist—or, may we not say, to act as understudy to?—Mr. Trewby, a few months after the projected retirement of that gentleman was announced, and which announcement was preceded by the lamented death of his former right-hand man (Mr. W. Sancroft Randall). However, there is no necessity now to speculate; the information as to the choice of the Board cannot be long delayed. Mr. Trewby has well earned his rest from the responsibilities and fatigues of an office which, from the very magnitude of its trust, is a peculiar one in the gas industry; and not the least of the crowning features of his occupancy of the office is that, although four years since the time had arrived for him to be relieved of its cares, he willingly, in the embarrassment of the Board in the matter of a successor, continued until now to bear them.

After the sketch (referred to above) of his professional career that was published in the "JOURNAL" in 1900, we need not to-day enlarge upon his work. The chapter that is now being brought to a close commenced rather more than fifty years ago. The services of Mr. Trewby were transferred for a time to Constantinople and Brentford; but from 1865 he has had an uninterrupted and highly responsible connection with the engineering work of the Gaslight and Coke Company. Even now, if called upon, he will give the Company the advantage of his great experience of their works and affairs. Meanwhile, his numerous friends will be interested to learn that his first enjoyment of liberty is to be found by passing (with his wife) the coming winter in Egypt. With him will go the best wishes of the profession; and to those wishes we unite our own, as well as the hope that health may be strengthened and preserved through many years, so that rest, freedom, and happiness may be experienced by him to the full.

Local Authorities Abandoning Gas-Works Purchase.

IN view of the awards in recent gas-works arbitrations, it is not an astonishing thing that the value of gas-works as investments has been largely discounted in the eyes of local authorities. There are certain of them to-day who would rather that the thought which was father to the wish and ultimately to realization of purchase had never been conceived. The Rickmansworth District Council are within a week or two of the time when they may, by carrying out their obligations, take possession of the property, rights, and privileges of the Gas Company; but now they would prefer a quick release from their engagement. Since the award was made in July, they have had time to reconsider their position; they had a longer time in which to think over what they were doing before they began to harass the Company, before, through their own action, they forced an expenditure of between £4000 and £5000 in warfare with that body, and before they obtained what they then desired—viz., the right to expropriate the Company's property. To-day, they are the Company's petitioners to deal as leniently as they can with them, if they liberate themselves from the obligation to purchase. After all that has happened, they have what appears to us as the effrontery to suggest to the Company that they should share, or—as a schoolboy would put it—"go halves," with them in the wasted outlay of nearly £5000, which the Council, and the Council alone, have occasioned. If they are so desirous of being freed from what they have brought upon themselves, it is almost a matter in which they should offer the Company something in the way of a solatium for the trouble and anxiety to which they have put them, instead of asking them to participate in a loss which they did not create.

A report in another column gives the reasons that cause the Council to be so greatly disappointed with their bargain. Putting the best complexion on the matter that the Clerk to the Council possibly can—by taking credit for savings and increases that are in the clouds, and leaving out of consideration all the uncertainties of capital and renewal expenditure—no profit, after providing for interest and sinking fund, can be handled by the Council until the sixth year's working has been completed. And if we may take the Clerk's figures, so far as they go, as being correct, not even after the sixth year will there be what the Council can claim as surplus profit; and the ratepayers will meantime have had to meet considerable losses. All this time, too, where are the consumers to be? They will have to thank their representatives on the Council for putting beyond them the very fair hope they are able to entertain under the Company of being supplied with gas at a cheaper rate as the business progresses. The Council have only themselves to blame for their present dilemma. They were frankly warned that they were building a castle on the sands by accepting such low estimates as they did of what the Company would be awarded for their business and property; but they turned a deaf ear, and went on obstinately to the end. Whom have they to thank? And does it now become them to go to the Company and suggest that they should bear a share of the costs incurred by the Council, so paying a price for retaining what is already their own until such time (if ever) within the specified limit as the Council pay up the award and the other obligations which Parliament put upon them, and to which they agreed? The Company have right—legal and moral—upon their side; and if the Council do not fulfil their parliamentary contract, they will have to pay (supposing that agreement does not result from the negotiations) all the costs they now wish to divide.

There are several considerations which must not be disregarded in the discussion of the position during the negotiations. The matter must be looked at first, we maintain, from the point of view of the gas consumers. If the Company consent to bear part of the penalty which the Council ought to pay by not completing their side of the bargain, it must not be overlooked that it is the consumers who will suffer by having to find the money to be paid by the Company; and, moreover, the consumers will suffer more than the other ratepayers by having to bear not only the Company's share, but their own portion of the expenses which will fall on to the rates. With us, the consumers may not see the justice of being compelled to sustain a greater loss than the non-gas-consuming ratepayers. From this point of view, and in the general interests of Rickmansworth, it appears to be far better that the whole of the ratepayers should share and share alike in the expense which the Council have brought upon them, rather than that the few as represented by the gas consumers should have to pay more than the majority. On the other hand, it may be to the interest of the consumers to bear the additional burden, and so put off for a time the day of cheaper gas, rather than come under the domination of the Council, and have possibly dearer gas, and many years to wait for a reduction of price. Looked at again from the point of view of the Company, and considering the abstract question of whether they would rather retain their concern than give it up, if

they so desire it may appear to them—although it does go "against the grain," and seems to be unjust—desirable to pay a price for the retention. We do not wish to say anything to jeopardize the negotiations; but we have a right to express the view that it would be better in the circumstances, and the fairest plan, for the Council, if they really desire to abandon the scheme, to spread the expenses as widely as possible, by calling upon each ratepayer to pay his proper proportion. It must not be forgotten by the ratepayers, too, that if the Council take over the concern, there will be (accepting the figures submitted at the last Council meeting) annual losses to be made up by them. Better, therefore, bear the present loss than go on year after year incurring unknown fresh ones. The matter is to be the subject of an interview between the parties towards the end of the month; and we shall await the result with curiosity.

Another instance of gas-works purchase not commending itself to a Local Authority comes from Bishop's Stortford; and so, notwithstanding all the efforts of the "Municipal "Journal," and the howlings of perfervid municipalizers, the advice tendered to the District Council by Sir George Livesey has prevailed—though only, in the voting at the Council meeting on Tuesday, by the narrow majority of one. Part, however, of the support to the proposal, we learn, was given merely with the view of bringing the question before the electors, and not as a definite view in favour of purchase. The "Herts and Essex Observer" takes a more enlightened view of the subject than is the general rule with papers which have an influence in guiding public opinion in matters of local concern. Our contemporary discusses the question on much the same lines as those we adopted last week in dealing with the "Municipal Journal," and congratulates the ratepayers on escaping from what might have been "a very "considerable danger." In this connection, we have a few words more for the "Municipal Journal." In a reference to our article of last week, the Editor makes a feeble attempt to convince his readers that, in considering this question of purchase, it is better to compare the results of the whole of the authorized municipal gas undertakings with those of the whole of the company concerns without taking into account how they are constituted, the relative geographical positions of the majority of each to the sources of coal supply, and the relative conditions of the majority from the trading point of view. He likewise refuses to recognize that the comparisons we made were intended to show the absurdity of the position he had previously taken up. If the Editor would give his readers an opportunity of perusing our article, he would, we fancy, find that they are not so obtuse as he confesses himself to be—perhaps because it is the shortest way out of a difficulty.

Gas Provisional Orders of the Session—
An Acetylene Scheme.

USEFUL as are the powers conferred by the Gas and Water Facilities Act of 1870, the number of gas and water undertakings availing themselves of them does not increase. The numbers session after session have a remarkable uniformity. For the past session, the total—25—is only two more than the year after the Act was passed; and, in accordance with several precedents, the whole of the 25 Orders were ratified by both the Board of Trade and Parliament. The report of the Board on their proceedings in this direction during the past year is noticed at length elsewhere; and therefore here only the conspicuous features of the Gas Orders call for reference. In the first place, it is observed that only fifteen of the applications were concerned with gas, and one was made by a combined gas and water undertaking. But if we except the Northampton Gas Company, there was not another undertaking ranking among the more prominent ones of the country that favoured this means of enlarging their statutory abilities. Nine of the applications were in respect of undertakings already authorized; five related to existing unauthorized concerns; and one, which imparts almost the only interest to the group—deals with a proposal for the manufacture and distribution of acetylene gas. This is the Elham Valley Order; and the district in which the promoters are proposing to operate comprises Elham and Lyminge (Kent), which districts have not hitherto attracted any systematized distribution of an illuminant. The promoters sought a larger area, but were limited to the smaller one by the Board.

Before specifically noticing this acetylene scheme, there are a few points, serving for illustration, to be drawn from the report. Only four of the Gas Orders escaped objection; but in all cases the objection was of such an invertebrate character, that the Board or the promoters found little trouble in giving those who preferred it their quietus, and, where local consent was withheld, the Whitehall authority took the short cut out of the difficulty by dispensing with it. This is all right so far as it goes; but it only emphasizes the contentions which we have recently made as to what will happen when, if ever, the Board obtain the extended powers which they are session after session fighting hard to secure in connection with the granting of Electricity Supply Orders to not only companies but municipalities. A second point is that, in six of the Orders, a maximum price for gas has been prescribed; but the Board reserve the power to alter it after three years, or to substitute a standard price with the sliding-scale. In the case of two Orders—Godalming and Stirling—a standard price was fixed; but, in both, the principle of a neutral zone has been applied. Both in Parliament, and now again in these Orders, it is remarked with satisfaction that the Board of Trade are not doing anything to stem the current towards lower illuminating power. In the Elstree and Boreham Wood Order, the illuminating power was reduced from 15 to 14 candles; and in the Stirling Order, from 25 to 20 candles. In five other Orders, a standard of 14 candles was allowed. It is also noteworthy that the formation of a renewal fund was granted in the case of the Waltham Abbey and Cheshunt Order. An agreed clause was inserted in the Elham Valley Order, empowering the Local Authority to give notice of purchase at any time after the expiration of five years, subject to their having been duly authorized to acquire the works.

This Elham Valley Order is unique and interesting, in that there is no private concern so far distributing acetylene gas under statutory powers, and the Portsoy (Banffshire) Gas Commissioners are the only local authority who have shown them a lead in the matter. That to the present time there should be only one authorized public undertaking and not a single authorized private concern supplying acetylene gas, after the struggling efforts for some years of those who put their faith in the youngest member of the family of illuminants, is evidence that its use is only practicable (though perhaps not preferable) in limited spheres—such as in the villages mentioned above. For purposes of illumination, Portsoy has shown that the distribution of acetylene is not altogether impossible; but it is questionable whether, in view of the general conveniences for which coal gas has become so popular, the older gas is not the preferable one to supply even in such villages. If incandescent lighting by coal gas could be eliminated from the comparison—and where coal gas is, there will incandescent lighting also be—between coal gas and acetylene gas, there would really be (in places of meagre population, where the demand must necessarily be but limited and the price comparatively high) little difference in the matter of cost for a given illumination. A reference to the accounts of the Portsoy Commissioners for the year ending May 15, 1903, shows that altogether in the twelve months they supplied 84,287 cubic feet of acetylene gas, at a price of 6s. per 100 cubic feet. A charge of 4s. per 1000 cubic feet for 15-candle coal gas would not, in such a place, be considered outrageous. The standard illuminating power of the Portsoy gas is 14 candles; but gas of 30-candle power was supplied. Turning to the Elham Valley Order, it is seen that the gas is to be tested at the rate of ½ cubic foot per hour, and with this consumption, the gas must give a light of 16-candle power. Multiply 200 half-feet by 16 candles, and one gets the equivalent candles of 1000 cubic feet of 16-candle coal gas when tested by the "London" argand burner at the rate of 5 cubic feet per hour. At the Portsoy price of 6s. per 100 cubic feet of acetylene gas, this would be dear if 14-candle gas only were supplied; but, as has been seen, the returns declare an average of 30-candle power. Multiply the 200 half-feet by 30, and the whole aspect of the comparison is changed. Therefore, *if* the Elham Valley gas people supply a gas as in Portsoy of double the standard illuminating power of 16 candles, their price of 8s. would not, for such a district, be exorbitant for illuminating purposes, if incandescent gas-burners could be ignored. But they cannot be; and therefore we must adhere to our professed preference for coal gas, even for such districts as Elham Valley and Portsoy. The possibility of a future competing supply of coal gas is provided for in the Elham

Valley Order, as it is enacted that the powers conferred on the undertakers are not to entitle them "to be heard on the "ground of competition against any Bill or Provisional "Order applied for in the future for the supply of coal gas "in any parish or place included within the limits of this "Order."

While dealing with this question of the public distribution of acetylene gas, there is one point connected with the Portsoy returns that we should like to have explained. It is seen that 10 tons of carbide were used to produce 107,319 cubic feet of acetylene gas. Of this, the private consumers only purchased 63,679 cubic feet; the public lamps used 20,608 cubic feet—together, 84,287 cubic feet. The balance represents nearly a quarter of the make; and it would be interesting to know how this balance is accounted for. However, as we showed last week, the market value of calcium carbide, through the absence of business, has dropped considerably. All the better for users of acetylene gas; and they may comfort themselves with the thought that it will take a good many Provisional Orders to permanently advance the value of calcium carbide if the requirements of Portsoy throughout a year are satisfied with 10 tons—say, at £11 or £12 per ton.

Larger Profit at Halifax

The recently issued accounts of the Halifax Gas-Works for the year to March last must prove cheerful reading to the ratepayers, whose thanks are due to the Engineer (Mr. J. Wilkinson) and all connected with the department for the good results achieved. The Chairman of the Gas Committee (Mr. Wadsworth), in dealing with the financial aspect of affairs before the Town Council, remarked that the past year would be one of those which would be looked back to in days to come with both profit and pleasure; and there was certainly much to support him in this view. In addition to the substantially increased quantity of gas sold, there was a reduction in the price paid per ton of coal, in carbonizing wages, and in other items. At the same time, there was a very large increase—about 1000 cubic feet—in the make per ton of coal carbonized, which, of course, meant a corresponding decrease in the quantity of coal required. The consequence of all this was a much lower cost at the works per 1000 cubic feet of gas sold. In the result, there was a profit on the working of the gas department of £25,628; but from this had to be deducted £1513, the loss to date on the tar-works, leaving a net surplus of £24,115, against £10,048 for the previous twelve months. Though undoubtedly there were many favourable factors last year, there was also at least one very unfavourable one—an enormous increase in the amount charged for rates and taxes. In addition to this, the Corporation are, of course, feeling the effect of the altered condition of the Money Market; the charge for interest having during the last few years advanced from 3·55d. to 5·8d. per 1000 feet of gas sold. One interesting feature of the accounts is the very much smaller amount that was spent during the past twelve months, as compared with the previous year, on the manufacture of carburetted water gas. Only £833 appears under the heading on this occasion, as against £3039 the time before; it being the opinion of Mr. Wadsworth that it is not policy to work the plant now any more than is absolutely necessary.

And the Price of Gas.

Under the gratifying circumstances just noted, it became the duty of the Halifax Gas Committee to decide what should be done with the profits. This is a question with regard to which it is almost impossible to please everybody—sometimes, indeed, it is difficult enough to please anybody. In the present instance, there were particular reasons which made a cautious policy on the part of the Committee especially desirable, for Mr. Wadsworth stated "that the whole of the retort-settings and regenerative furnaces (including the new inclined retorts) would require rebuilding within the next few years," and that every penny of the cost of the improvements and renewals which were now being carried out would be charged against revenue. These considerations (and the fact that at the end of the financial year there was a bank overdraft of close upon £30,000) rendered the Committee extremely desirous of building up a substantial reserve fund; and it was suggested that they should start the fund by appropriating last year's profits and those of future years, until a fairly respectable sum was reached. That this will be to the ultimate benefit of the undertaking cannot be denied; and the adoption of so commendable a policy was rendered easier by a concession of 2d. per 1000 cubic feet in the price of gas, with discounts varying according to consumption. The extra inducement thus held out to large users of gas to take their supply from the Corporation did not meet with unanimous approval; several members expressing the opinion that the smallest consumer should be treated in exactly the same way as the largest. How the small consumer would benefit by such an arrangement it is not easy to understand; for the further lowering of his price could only be accomplished to the detriment of that charged to the big engine-users. And if as a consequence the manufacturers were driven to seek elsewhere for a suitable supply of power, the small consumer might soon have cause to lament the loss of their custom; for it would be certain to adversely affect the price he would be called upon to pay for his own gas. As to the question of the prepayment consumers participating in the proposed reduction, it was pointed out that this class were already receiving more favours than the ordinary ones, with whom they would now be brought more into line; and some interesting figures were quoted in support of this contention. There is some trouble in satisfying the various kinds of consumers; for the different circumstances attaching to each are not always clearly understood. It is, of course, for the Corporation to decide whether or not the big power users are worth retaining as customers. If they are, it can only be done by rendering the terms as attractive as possible.

The Fees of Arbitrators.

The question of the fees chargeable by arbitrators for their services has recently been discussed in the pages of "Engineering;" and the conclusions at which our contemporary arrives on the matter will be of interest to readers of the "JOURNAL," as well as to those engaged in other branches of the engineering profession. In cases in which the fees payable to arbitrators are fixed beforehand, of course, no dispute is likely to arise; and where no such arrangement is made, it was long ago decided that there was an implied obligation on the parties to the reference to pay the reasonable fees of the arbitrators and umpire—should one be engaged. It is also pointed out that an arbitrator is protected by the fact that he has a lien on his award for the amount of his charges. It has been held that arbitrators whose award has not been taken up are privileged from producing it or disclosing its contents, as witnesses on the subpœna of a party to the submission; so that they may therefore retain the award until the fees have been paid, which is usually the plan adopted. Though, however, an arbitrator may settle his own charges, he is not at liberty to fix an exorbitant sum. If he does so, and the sum is paid under protest to obtain the award, the overcharge may be recovered in the Courts. The duty of an arbitrator to specify the items in his bill was laid down in a case tried at the beginning of this year. The question arose on a motion to set aside an award on the ground that it was bad, inasmuch as the costs of the umpire and arbitrators were unreasonable, and ought to be referred by the Court for taxation. The award contained a lump sum to include the costs of, and incident to, it; and Mr. Justice Wills said that though the amount named might be quite reasonable, it could not be right conduct on the part of an umpire, however *bona fide* he might be, to render it impossible to say how much he was awarding himself for costs, and how much to the arbitrators. He therefore sent the award back to the umpire. In the course of his judgment, Mr. Justice Wills remarked: "It is known, or, at any rate, I with my experience know, that it is the practice of certain arbitrators—especially arbitrators of a profession which shall be nameless—to value their services very highly." Our contemporary thinks the "nameless profession" to which the learned Judge was referring was probably the engineering profession; and it advises members to state the amount of their fees—making quite clear the sum which is to be allotted to the arbitrators and the umpire. As to the amount which an engineer is entitled to charge for his services as arbitrator, this appears to "Engineering" to be a question of degree, and one which must be settled in reference to the particular facts of the case, and how far he has to travel. In a case decided some years ago, ten guineas a day was considered reasonable; but the Court will now refuse to interfere when very much higher fees are charged.

THE ENTERPRISE OF THE WELLINGBOROUGH GAS COMPANY.

Completion of the New Works.

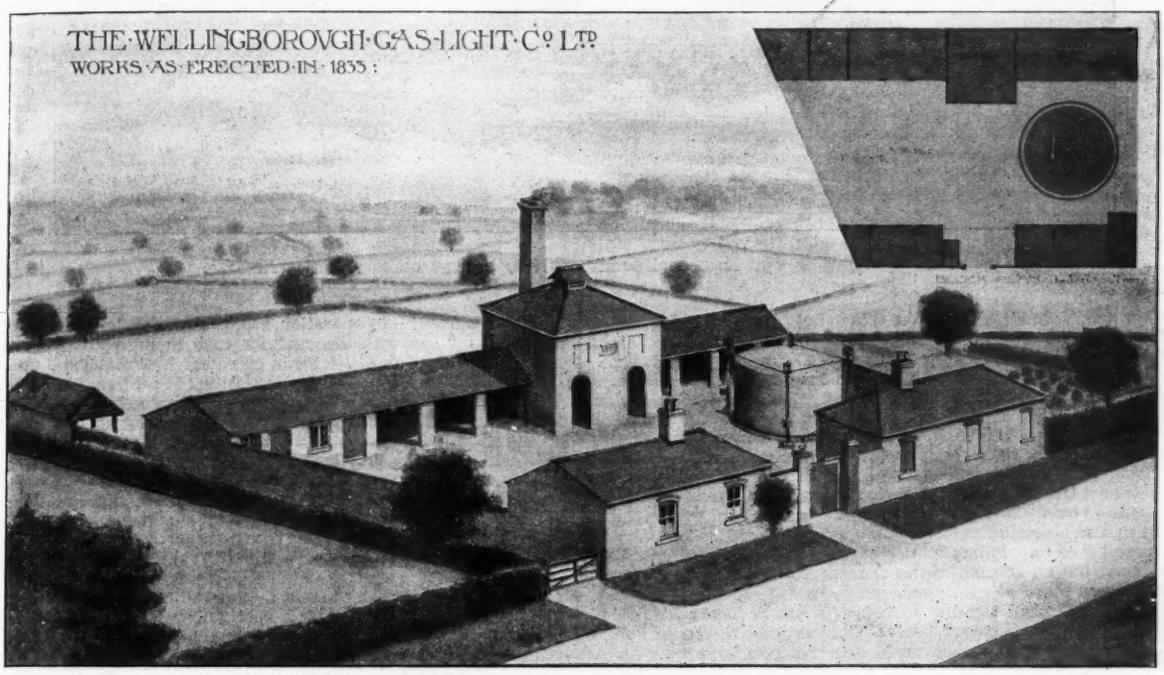


FIG. 1.—THE FIRST GAS-WORKS AT WELLINGBOROUGH—1833.

This year is an epochal one in the history of the Wellingborough Gas Company; for in it they are leaving behind them, to a large extent, the past scene of their active existence, and all the old conditions and associations that clung to it, and are entering upon a fresh era in their career, in works new from the hands of the contractors, and which are constituted in manner and by methods that assure to both Company and consumers the production of gas now and hereafter on more—or rather, we may say, the most—economical lines. To carry back the memory to the old works and then to look at the new, is to pass from the memories of pent conditions, plant so confined that work could not be carried on the last few years with any degree of comfort, and situation which itself caused an abnormal expenditure—to absolute freedom. For in the new works, the Engineer (Mr. J. T. Lewis) has allowed himself a latitude in the disposition of buildings and plant, and in their design, which ensures the complete abolition of many of the experiences of the past, and will give to all concerned the sense of security in their operations, present and future, which they could never have enjoyed in the same measure during the years preceding the day when Mr. Lewis's plans for new works were endorsed with the confidence ripened by years of experience of their adviser, by the Board of Directors. Before the description of the works is finished, readers will themselves be able to judge whether we have rated them too highly.

RECORDS AND REMINISCENCES.

[Prepared from a chronological record compiled by the Secretary of the Company, Mr. S. H. KIMBELL.]

Old conditions and old associations have been mentioned. The history of the Wellingborough Gas Company is a long one; and had the new works been opened on Jan. 8 last year, the day would have seen the completion of threescore years and ten since the Company was originally formed. It was on the date named in 1833 that—an offer having been made by a Mr. T. A. West to erect gas-works for the supply of the town—a number of gentlemen and one lady agreed to take shares in the then proposed Company. Events moved quickly, for 900 yards of land in the Milestone Close, upon which to erect works, were purchased by Feb. 21 for £50. Works were constructed and main pipes laid by the Mr. West mentioned, at a contract price (including the purchase of land) of £2650. He was also paid a further sum of £110 for service-pipes, tools, &c. The capital of the Company was £2750; the additional £10 spent being provided later out of the profits. The gas-works in 1833 look very curious when compared with the new ones which were being erected in 1903. A good idea of what the works were like in the thirties is furnished by a sketch (fig. 1) which Mr. Charles Hale, A.R.I.B.A. (a nephew of Mr. Kimbell) has made from old photographs which have been preserved of the original works. As near as can be ascertained, gas was first lighted in the town on Sept. 1, 1833. Whether that is so or not, certain it is that, on Oct. 4 of that year, it was resolved that "a special discount of 20 per cent. should be deducted from the half-year's payment for gaslight"—gas being then supplied on a scale of so much per light per annum, according to the kind of burner used and the hours of lighting and extinguishing. One of the cards giving the scale of prices and other particulars has been preserved in a frame in the Company's Board-Room. Regulations were made fast in those days; for five days after the resolution just referred to, it was decided that any person taking £8 worth of gas per annum should be allowed to burn by meter; and twelve months later, meters were allowed for a

FIG. 2.—VIEW OF THE NEW WORKS TAKEN DURING CONSTRUCTION.

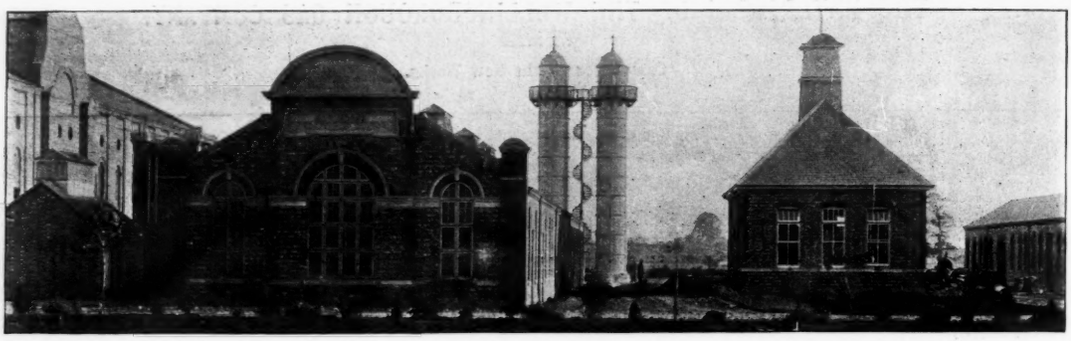


FIG. 3.—VIEW OF THE MIDDLE BLOCKS OF NEW WORKS FROM THE NORTH END.

guaranteed consumption of £6. There is, however, nothing in the books now to show what was the charge per 1000 cubic feet. But there is an account in the Company's office dated May, 1840, for gas used at the house of Mr. R. Bodaly, and which was then charged for at 15s. per 1000 cubic feet. There is extraordinary interest attaching to this account, inasmuch as it is for gas used for both lighting and *cooking;* and the roasting portion of the cooker used in those early years continued in service up to March, 1886, when a new one was supplied to replace it.* The Company, the records of the early thirties show, would not allow anyone to have gas except the fitting was carried out by the Company; and a resolution of June, 1843, shows that this system was long adhered to. Public lighting commenced soon after the works started; but no account of the charges made for it is found until 1841, when there was an agreement to furnish gas to 39 lamps for £150, the time of lighting to be 21 nights in December, 1841, and in January, February, March, October, and November, 1842. This works out to rather more than 1d. per lamp per hour. The minutes of 1836-44 dealing with the purchase of coal give an approximate idea of the amount of business done by the Company in those early days, and the value of gas coal. Between 1836 and 1844, the consumption of coal rose from 80 tons to 120 tons; and the price gradually fell from 35s. to 28s. 4d. in 1843—being in 1844 29s. 9d. (The consumption of coal last year was 12,333 tons, and the average price was 15s. 3d.).

Coming to 1846, the works were let on lease to Mr. Thomas Sharp, at the annual rent of £160; one of the conditions being that the price of gas should be immediately reduced to 10s. per 1000 cubic feet. On the expiration of Mr. Sharp's lease in 1860, Mr. George Bower, of St. Neots, was called in to report on the works, and advise what alterations and extensions were necessary; and in the succeeding year, an additional purchase of land was made, and (for that time) considerable extensions of the plant were carried out—the capital of the Company being increased to £4150. In 1863, the price of gas was reduced to 5s. The Company then continued to make its history much in the same way as other gas undertakings have done. The records show that business expanded, which, of course, necessitated from time to time considerable additions to capital and plant. We cannot, in view of the large new works now awaiting description, enter at length into this more modern history; but there are a few additional points which should not be overlooked. It is seen that it was in 1873 that Mr. S. H. Kimbell was appointed Secretary, in place of Mr. J. H. Hale, who had resigned; and towards the end of 1882, Mr. Lewis was appointed Manager as from the 1st of January of the succeeding year. The Company, it is seen, have always pursued a good commercial policy. As far back as 1884, it was resolved to allow a special discount of 5 per cent. off the current price of all gas used for gas-engines; and, in 1888, a scheme of weekly payments for gas, formulated by the Secretary and Manager, was put into operation, as was also a system of monthly payments for gas, with discount for cash in fourteen days. In 1890, the Company's district was extended by Provisional Order to Wilby, Doddington, and Earls Barton. Five years later, it is found that the price of gas in Wellingborough was 3s.; in Irchester 3s. 2d., in Earls Barton 3s. 7d., and for engine supply 10 per cent. discount was allowed. To-day, the prices are: Wellingborough, 2s. 9d.; Irchester, 3s.; and Earls Barton, 3s. 4d. The most convincing testimony that can be found of the wisdom of the Directors and those who have advised them in the modelling of their policy, is the great expansion of the business during the last twenty years. In 1884, the consumption of gas was 30,377,100 cubic feet; in 1894, it was 53,486,000; and in 1904, it was 131,593,000 cubic feet. Note this! Twenty years ago the consumption was less than the odd millions now supplied over 100 millions; and in ten years it has increased by no less than 78,107,000 cubic feet. These few notes culled from Mr. Kimbell's interesting compilation may appropriately be ended by placing on record the names of the gentlemen constituting the Company's Board in this important period of the history of the concern. They are: Mr. David Dulley (Chairman), Mr. J. T. Parker (Vice-Chairman), and Messrs. F. Gravely, Jas. Heygate, C. L. Welldon and W. Wyldes.

* An illustration of the cooker and the account was given in the "JOURNAL" for April 22, 1902.

THE PROPOSAL FOR NEW WORKS.

We have to go back three years into the past to see the origin of the new works. It has been shown how the business of the Company expanded, and allusion has been made to the fact that the old site of the works could not for ever continue to meet such a growth. It would indeed have been the height of imprudence to have continued in such a situation, seeing that the locality was an ill one for dealing with the conveyance of materials. And an ever-extending business meant an ever-increasing quantity of material to be transported to and from the works. Thus it came about that, on July 9, 1901, Mr. Lewis presented to the Directors a report, in which he stated that the questions of coal deliveries to, and the extension of, the manufacturing portion of the works had received from him much consideration; and the result was a scheme of so large a character that, at first sight, it might appear to be too visionary, but he felt that this would disappear when the facts were considered. His recommendation, in brief, consisted in finding a new site for a manufacturing station adjoining a railway; and the one which he considered most suitable was on the Union Road adjoining a loop-line of the Midland Railway Company. A siding to the suggested new works could be constructed here at the same level as the loop-line; thus giving great facilities for unloading coal and other material, or for loading coke, tar, &c. The report outlined the new works that would be required, and the savings that could be effected by utilizing such of the plant from the old works as had not become spent or too antiquated to realize economy.

Before stating what ensued on this report, it may be mentioned that the expense of coal delivery at the old works was a very

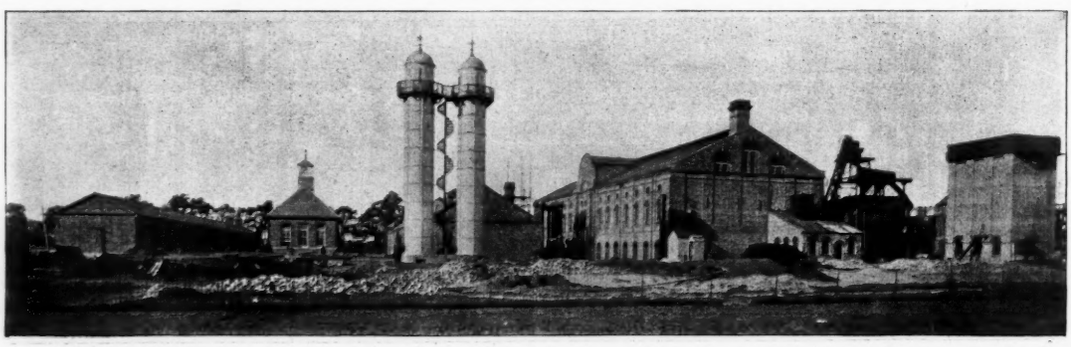


FIG. 4.—GENERAL VIEW OF THE NEW WORKS FROM THE SOUTH END.

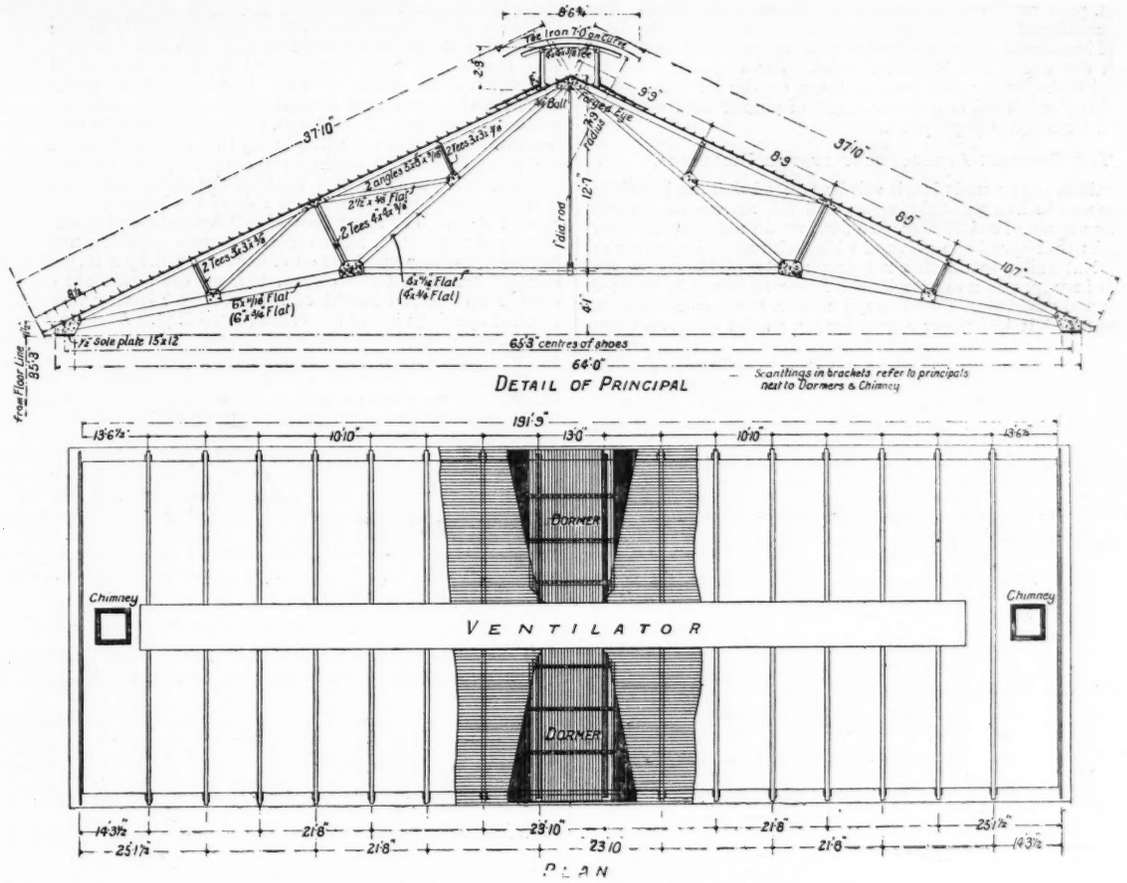


FIG. 5.—DETAILS OF THE RETORT-HOUSE ROOF.

serious one, though really for cartage the cost per ton was low—viz., 8½d. per ton. But it was not economical. On the other hand, too, coke was costing the Company 1s. per ton to send to the North-Western Railway, and 1s. 6d. to the Midland. The expense of carting tar and other materials was in proportion. Another consideration was that water was costing the Company for the old works no less than £120 per year. Then as to the condition of the manufacturing part of the works, the last new retort-house (built in 1896) was in good condition, the purifiers had still a fair working life before them, and so had certain other parts of the plant; and these portions of the works, and the materials of the last retort-house, the Engineer saw his way to bringing into use in the new works. The gasholders, too, were in good condition. But in other respects the plant, following the natural order of things, had become bad, inefficient, and cramped. The point, too, had been reached at which the Company were compelled to extend, as they were approaching perilously near to their maximum carbonizing capacity, which was 660,000 cubic feet per twenty-four hours—being only between 10,000 and 20,000 cubic feet above the maximum day's consumption.

However, the proposal of their Engineer, large as it was, and involving a considerable capital outlay—the total cost of the new works, we believe, has been not far short of £30,000—did not give the Directors very extended concern. They looked at the matter from a business point of view. They saw that their prosperous undertaking demanded the investment of further capital; and they recognized the economy upon which the greater scheme was founded. After the presentation of the report, only a fortnight elapsed before there was a special meeting of the Board, at which, after a very short discussion, the scheme was adopted, and a resolution passed to take steps to endeavour to acquire from the Trustees of Fisher's Charity the site suggested by the Engineer in the Union Road. We venture to say that the confidence displayed by the Board in their Engineer on this occasion will be ever cherished by him as a pleasant memory in his professional career. However, the land being the property of a charity, the procedure connected with the purchase was somewhat tedious. But early the following year (1902) the consent of the Charity Commissioners was obtained to the transfer; a Provisional Order was secured by the Company; and in August the purchase was completed—the Company taking possession of the land during September, and operations were immediately commenced.

THE SITE.

The extent of land which the Company purchased is some 28½ acres, and this is a possession for which those who will constitute the Company in the far-off future will bless those who now direct the fortunes of the Company. It is an assurance against any difficulties connected with business development in the future, and equally a security for continued economical working. It is always a good thing for a gas undertaking when acquiring a new site to take an ample breadth of view as to the possible and unknown requirements of times to come. Of this land (which by the way is situated some distance from any residential property) the Company have fenced off 5¼ acres for their new works; and they have let the rest for grazing purposes. The portion on which the gas-works now stand is that (as is seen by the ground plan) nearest the railway; and there is also the River Nene at hand, which river is in communication with the Grand Junction and other canals. The railway (which runs on the eastern side of the site) is on the Midland branch to Northampton; and this particular portion is a loop connecting the Midland and the North-Western systems. Looked at from a gas-engineering point of view, the site was an exceptionally good one; and its selection reflects the sound judgment of the Engineer. It is exceedingly level; and being some 14 ft. 3 in. below the railway, it enabled a good height to be obtained for a railway siding. There was only one drawback; and this was that part of the land was liable to floods. But that has since been made up above flood-level; and a very efficient system of drainage has been put in.

As the new works are approached, one is immediately struck by several things. It is observed, in the first place, that the works have been set a good distance away from the public road; and that the view that presents itself to the passer-by is anything but a disagreeable one. The buildings have been constructed in ranges with only their ends facing the public road, and with broad ways between. The design of the parts fronting the public road is such that they cannot fail to give the impression that gas-works are not such bad places after all, and truly these new works at Wellingborough are everything that can be desired, by the Engineer down to the lowest employee in rank. Space being at his disposal, too, Mr. Lewis has determined that no notion shall ever be fostered in Wellingborough that gas-works have a devastating effect on vegetation or foliage; for between the public road and the works he intends to demonstrate, at a moderate expense, that it is not so.

Let us start at the main entrance to the works. This is situated at the north end of the site in the Union Road. The entrance-gates, themselves are worthy of note. The main gate is 10 feet wide and the side one 5 feet—both being 8 feet high; and the wing walls have wrought-iron fences to correspond. The gates are of wrought iron, of good artistic design, and were manufactured by Messrs. James Milne and Son, of Edinburgh. From these gates leading up to the offices, there is a 24-foot road, with a

6 ft. 6 in. path on the right-hand side. Beyond the offices, the road is continued (with a width of 20 feet) to the end of the first range of buildings. The broad sweeps of roadway which one gets through the works is a decided feature. The entrance road is bordered with shrubs; and beyond these on the left-hand side, and facing the offices, is a good extent of vacant land which is destined for recreation purposes.

The General Arrangement of the Buildings.

Consulting the ground plan, it will be noticed that the buildings are disposed in five parallel ranges; and this arrangement gives one a fine sense of orderliness. In fact, we do not know another gas-works that have been planned with such regularity in line as these. Naturally, to do this requires plenty of liberty in the matter of space, and no necessity for fitting buildings in isolated corners and positions. Of course, it makes, too, for economy in building; and it has many conveniences, as the observant gas man will find in making an inspection.

Before proceeding to describe the buildings in detail, a general idea of their arrangement will be helpful. The first block on the right at the end of the entrance road is devoted to the offices, stores, and workshops. Between this range and the next long

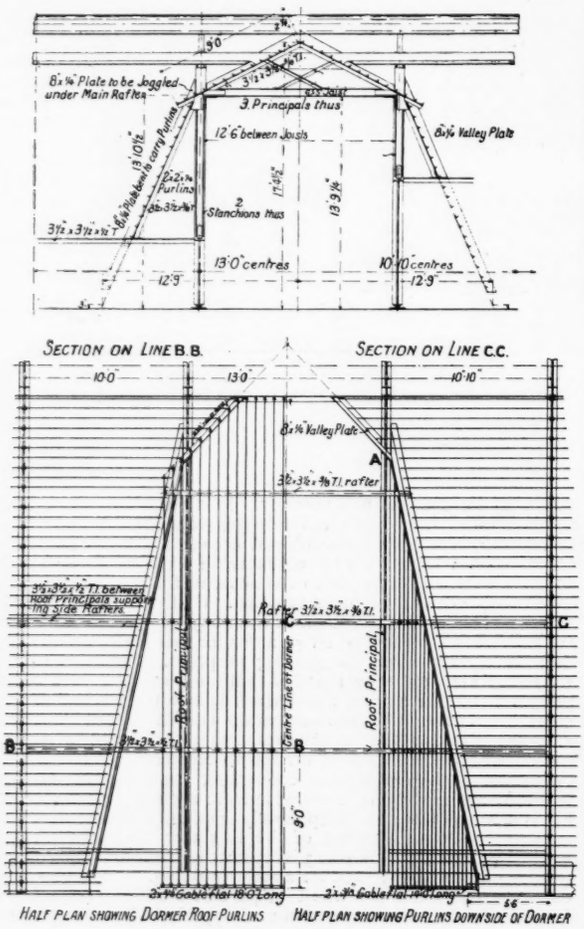


Fig. 6.—Details of Retort-House Dormers.

block, there are two ornamental lawns, on which are planted some shrubs, and later on these will be supplemented by rose trees. Interposed between the lawns is the meter-house, with a clock tower of artistic design, and containing a clock facing four ways; so that it can be seen from almost any part of the works. The next, or third block, contains a reading-room (which is also to be used for shareholders' and other meetings), dining-rooms, lavatories, and bath-room, engine and exhauster room, boilers, and sulphate house and store. The fourth building is the retort-house itself; and next to that come the coal-store and railway sidings, with at the southern end the railway weighbridge, pump-house, and an overhead water-tank. In addition to the five parallel blocks, at the southern end of the site is the purifying-house, scrubbers, and a Livesey washer; while between the third block and the retort-house are found the condensers, a sulphur-recovery plant, and the men's latrines. This gives a general idea of the position and purposes of the buildings; and now we will proceed to deal with them in greater detail.

The Retort-House and Carbonizing Plant.

The retort-house is a building in which excellent provision has been made for the future. Its external dimensions are 195 feet by 68 ft. 9 in.; and the height is 35 ft. 3 in. up to the eaves, with a further 16 ft. from the shoe of the principals to the ridge. Above this is the ventilator, 2 ft. 9 in. high and 8 ft. 6¾ in. wide. The house has been constructed of local washed bricks of different colour, relieved with bands of blue Staffordshire bricks, and ornamental Leicestershire (Sileby) bricks for the gables and arches. In addition, Derbyshire stone is used where needed. The walls are 2 ft. 4 in. up to the stage-floor line; and the piers retain this thickness throughout, but the panels are reduced to 14-inch work. Besides the main door, there are fourteen other openings on each side of the house, leading to the ground floor. The stage-floor is well lighted; and both accessibility and ventilation have received ample consideration. It is lighted by sixteen windows on either side, 9 ft. by 4 ft., with semi-circular heads. At the centre, too, on each side are dormers carried up the full height of the roof, and having large semi-circular openings above the eaves (figs. 6 & 7). At the north end of the house, there are two large doorways to the ground floor; and above these are two smaller doorways leading on to the stage; and in the gable, there are also three openings with semi-circular heads. At the southern end, there are only the three openings in the upper part of the gable, excepting those required for the coke-conveyer, &c.

The roof is of plain but substantial design. In all, there are sixteen principals 10 ft. 10 in. centres, excepting the end ones, which are 13 ft. 6½ in., and made of extra strength for the increased span. To the angle-iron purlins, 2 in. by 2 in. wooden laths are screwed; and to these, in turn, are fixed 20 in. by 10 in. Bangor slates. The ventilator is made of ¼-inch plate, curved to a radius of 7 ft. 9 in. This is simply supported by cast-iron stands from the principals of the roof.

The Stage-Floors and Retort-Settings.

It should be explained at once that at the present time only two benches for single-retorts have been erected the length of the

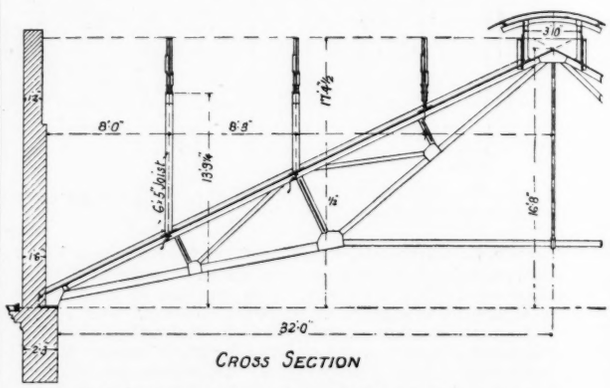


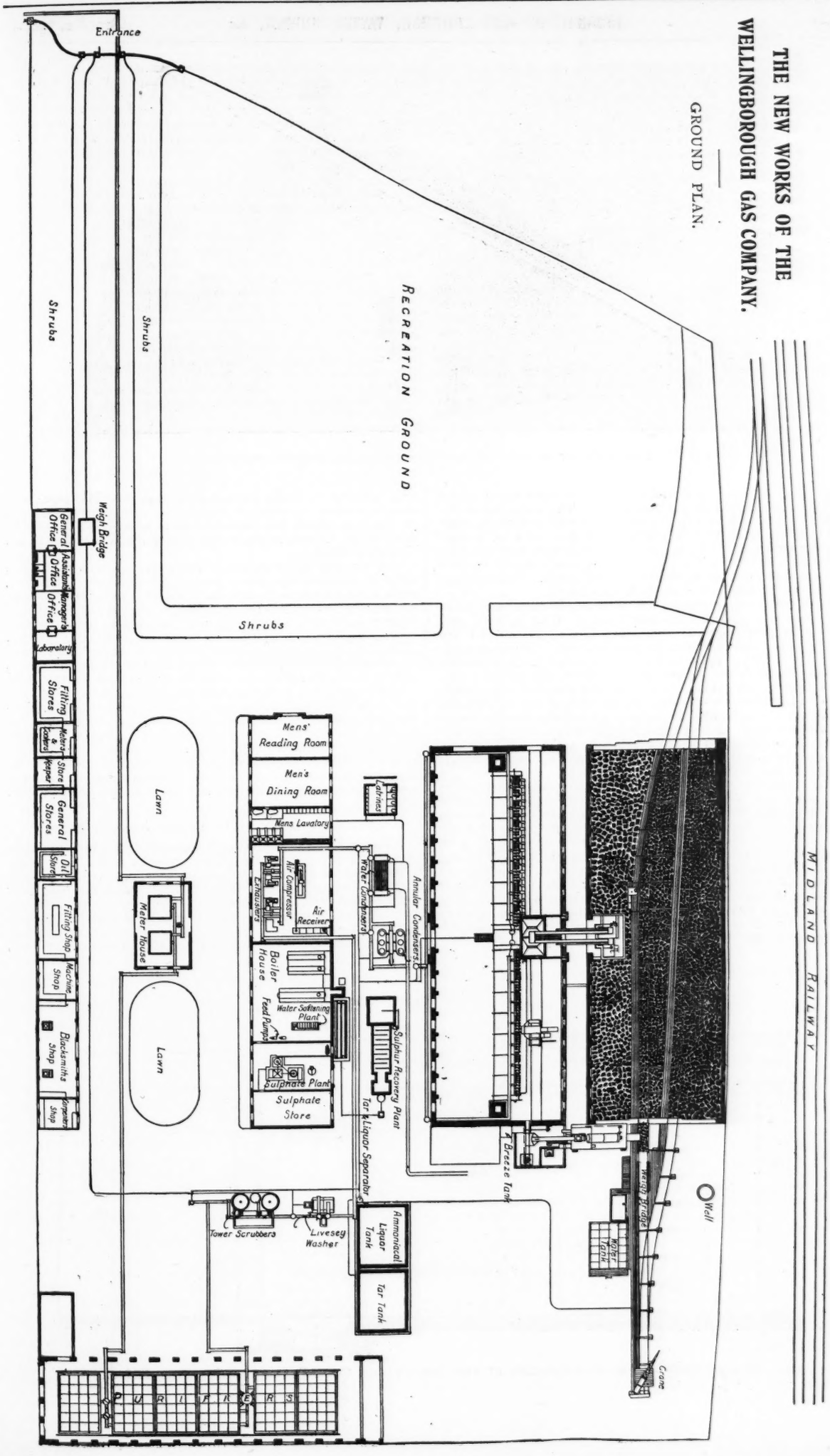
Fig. 7.—Details of Retort-House Dormers.

house. Only one has been completely fitted with retorts; but the work of filling the other is proceeding now. This has left one-half of the house in reserve for the future. Consequently, the stage-floor on one side of the house only has been constructed; and this is 9 ft. 6 in. above the ground-floor level. The stage is formed of eighteen girders 16 in. by 6 in., supported by brick piers, capped with York stone, and built quite independent of the wall of the house and the setting. Between the girders are seven rows of longitudinal girders. These are all 8 in. by 5 in., with the exception of the two rows to which the rails for the drawing and charging machine are attached. These special girders are 10 in. by 6 in. Concrete arches are formed between the longitudinal girders; and the top is paved by blue Staffordshire chequer bricks.

Turning to the retort-settings, each bench consists of seven beds of eight ⌂ retorts, 10 ft. by 22 in. by 16 in. inside measurement, set one on each side of the furnace, with two horizontal rows of three above. The arches are 10 ft. 10½ in. centres; and the furnaces are of the regenerative type. The settings are practically the same as those put into the last house built at the old works. Those were of the West type in the main; and, similarly, the new settings are also carried out on that system. They have been found most satisfactory, so far as efficiency, heating, and economy of fuel are concerned. The secondary-air and waste-gas flues are formed of blocks and tiles of Mr. Lewis's own design, and specially made for the purpose (see fig. 10). The tiles are 9 in. by 12 in. by 3 in., and are tongued and grooved. The cover to the flue is formed of a semi-circular block to fit into the tiles. The secondary-air flues are formed with similar tiles and arch covering. The joint between the cover and the tile of the waste-gas flue is placed midway between the joint and cover of the secondary-air flue, so as to prevent any possibility of short-circuiting. More than three years' practical experience of this arrangement satisfies Mr. Lewis that there is not the slightest short-circuiting in the flues. The tiles, of course, cost more than ordinary plain bricks. But they are quite simple; and by them the expense of building the flues is very much reduced. The

THE NEW WORKS OF THE WELLINGBOROUGH GAS COMPANY.

GROUND PLAN.



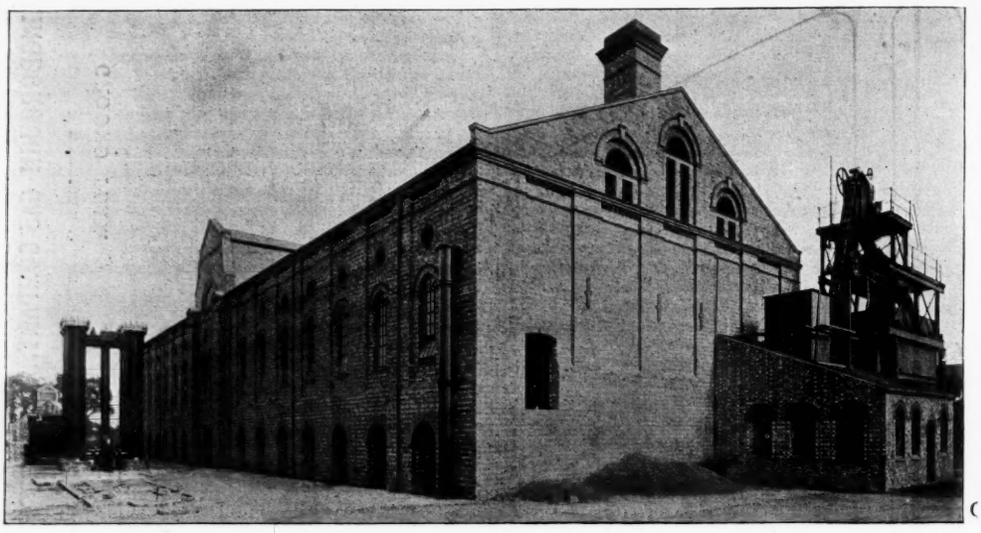


FIG. 8.—VIEW OF THE RETORT-HOUSE WHEN NEARING COMPLETION.

combustion furnaces, arches, and so on are constructed of the best Silica and Ewell bricks and blocks. The main flue in the settings is 5 ft. high by 2 ft. 3 in. wide. At each end of the house is a chimney, rising 65 ft. above the floor-level, with an internal measurement of 3 ft. 6 in. square. The walls vary from 2 ft. 9 in. at the base to 14 in. at the top; and at intervals of 5 ft., there is a flat wrought-iron band bedded in the brickwork. The chimneys are lined with fire-brick throughout their length.

As to the bench ironwork, this is of a substantial character. The end buckstays of each bench are of 16 in. by 6 in. steel girders let into stout cast-iron shoes in the ground, and tied together by 2¼-inch diameter longitudinal rods. The front buckstays are formed of 14 in. by 6 in. girders bolted to the transverse girders of the floor. Below the stage-floor, the buckstays are 10 in. by 6 in., let into cast-iron shoes, and attached to the inside of the transverse floor-girders. At the back of the benches, the buckstays are 14 in. by 6 in., and are let into the floor by means of cast-iron shoes, strongly cemented in. The buckstays are tied together over the tops of the benches by 10 in. by 6 in. transverse girders; and upon these rest the cast-iron brackets for the hydraulic, gas, and tar and liquor mains.

Regarding the mountings of the settings, the mouthpieces and lids are of West's self-sealing type, and the ascension and arch pipes are all of steel (6 inches diameter), with cast-iron bridge pipes. The hydraulic main is of steel, with flat top and back, and curved front plate—2 ft. 3 in. by 2 ft. 3 in. The main is divided into 10 ft. 7¾ in. sections—that is to say, one for each bed of retorts—fitted with an 8-inch gas-valve and outlet, and a 4-inch tar and water valve. The tar and liquor main is 8 inches in diameter, and the gas-main 15 inches. Both tar and liquor flow into a receiver. The tar falls to the bottom, and is run off at stated intervals during the day; while the liquor overflows by means of a weir at the top of the receiver. This receiver is really formed of 24-inch cast-iron pipe, with flanged bottom, to which is attached a 4-inch tar-outlet cock. At the top (above the liquor level) is a weir, which can be adapted to various levels, so as to maintain a true seal in the hydraulic mains.

The working of the retorts is giving every satisfaction. The make of gas per mouthpiece averages 9180 cubic feet. Therefore, when the fourteen beds are completed, the productive capacity will be equal to not less than 1,008,000 cubic feet per twenty-four hours; while the house itself will be able to accommodate settings equal to a production of more than 2 millions per day. The make of gas per ton is excellent; being 11,300 cubic feet of an average illuminating power of 16·2 candles. The coal used is chiefly South Yorkshire—for example, Rother Vale, Barrow, some Old Silkstone, and Holbrook, from the Eckington Collieries. As to the fuel consumption, of course, Mr. Lewis is hardly yet in a position to say anything about this; but, at the present stage of his working, the coke he has available for sale is about 10½ cwt. per ton of coal carbonized. More is, of course, required for fuel on the new works than at the old, simply because there is more machinery; and not until there has been at least a year's experience under the new conditions, will Mr. Lewis be prepared to bind himself.

THE COAL DELIVERY PLANT AND ARRANGEMENTS.

An important and interesting feature of the works is the plant that has been laid down for dealing with the coal supply, which is delivered on to the Gas Company's sidings by the Midland Railway Company. It is worthy of observation that the latter Company constructed, at their own expense, the siding complete from the Wellingborough Station Goods Yard to within 100 feet of the coal-store; thus recognizing the excellent client they had here. The Gas Company carried out all the rest of the work,

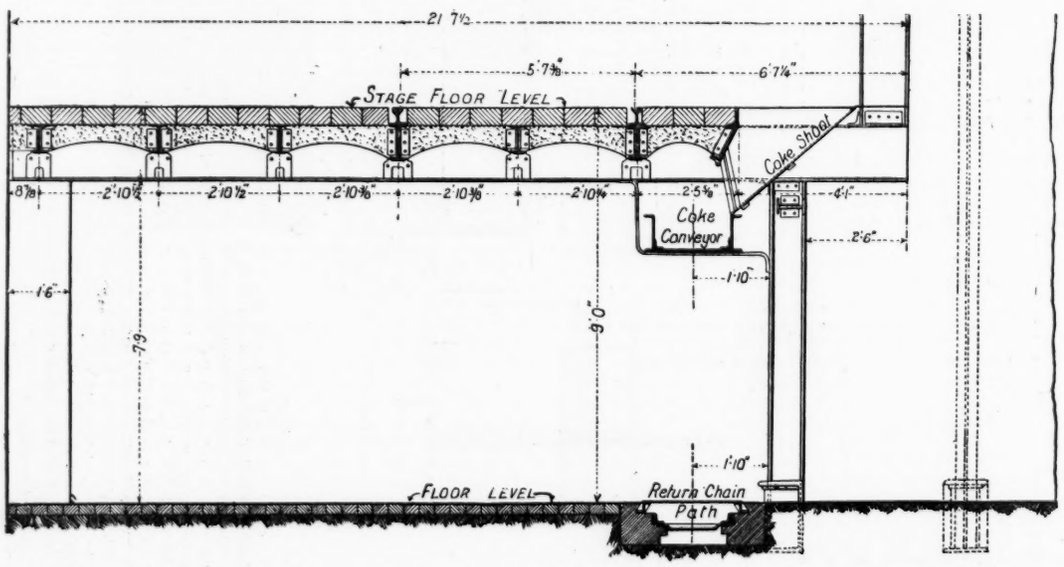
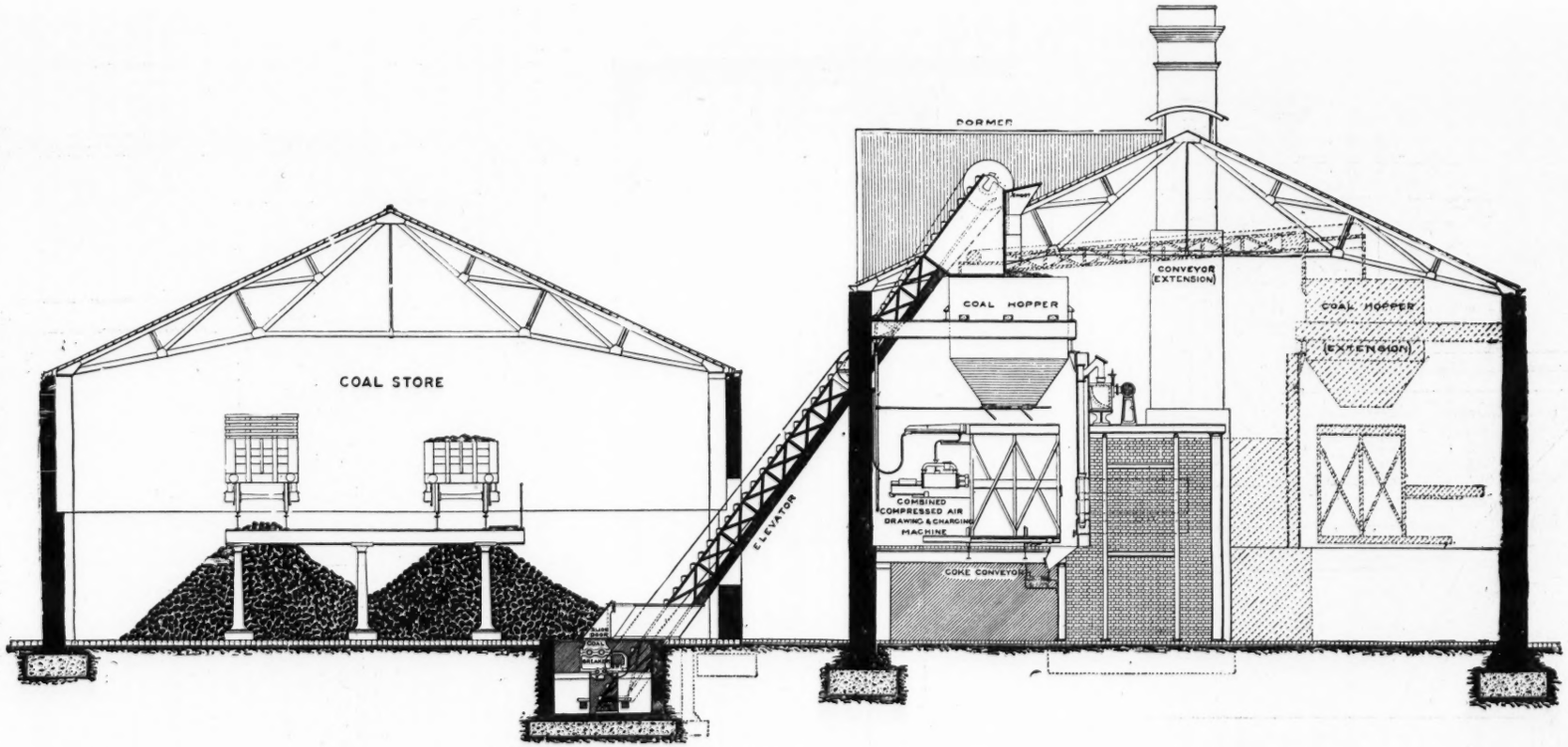


FIG. 9.—SHOWING THE CONSTRUCTION OF THE STAGE-FLOOR, COKE SHOOT, AND CONVEYOR TROUGH.



CROSS SECTION OF THE COAL-STORE AND RETORT-HOUSE.

representing some 130 yards of sidings. Altogether on their own sidings, the Company can accommodate about 35 waggons. At present the sidings run through the coal-stores to a point something like 50 yards beyond the southern end of the stores, and past the pump-house; but it is probable that the sidings will have to be extended a little further, as they are not quite so long as the Engineer would prefer.

A few particulars as to the construction of the sidings may be included here. They are formed of longitudinal girders, carried on 18 in. by 7 in. cross girders and stout cast-iron columns, which are braced together by 3 in. by $\frac{1}{2}$ in. flat-iron ties. Where there are double lines, the supporting structure is composed of three columns; but where the lines narrow down into a single one at the southern end, only a pair of columns are required. The steel rails (85 lbs. per yard) are attached to the longitudinal girders; giving a distance between the ground-level and the top of the rails of 13 feet. Towards the southern end of the store is a 40-ton weighbridge by Pooley.

The Company have now ten 20-ton waggons of their own. These large waggons, it may be incidentally stated, are new things to the railway companies and the makers; and the experience of Wellingborough is that some few alterations will have to be made before they can be regarded as completely satisfactory. Lubrication, for one thing, is not sufficiently perfect; and in transit it is found by the railway companies that they have to deal somewhat differently with them than with waggons of lighter capacity. However, the Gas Company expect to net a saving by their aid. The waggons, as already stated, are put into the store by the Railway Company, and are then pulled into position as required, by a compressed-air capstan—the coal being dropped into store at the most convenient points.

The coal-store itself needs little description. It is 195 feet long (outside measurement) and 70 ft. 6 in. in width, and has a capacity of about 5000 tons, which is a considerable, but at the same time prudent, storage for works of this capacity. For the purposes of ventilation, a space of 11 feet separates the coal-store wall from the retort-house, part of which, however, is being roofed in to shield the elevators from the weather. The store is covered with a roof of character similar to that of the retort-house.

A pair of coal-breakers feed into elevators rising from the coal-store to an overhead storage hopper, of 60 tons capacity, situated centrally over the stage-floor of the retort-house. The elevators have separate steam-engines; but beyond this there is no necessity to describe this portion of the plant, as it is of the well-known type of the West Gas Improvement Company. The whole of the coal is dealt with by one man, who is able, with comfort, to unload five waggons of coal of 17 to 18 tons capacity within his ordinary working day of ten hours—that is from 80 to 90 tons—and elevate it into the hopper. This is the best proof as to what can be done by the aid of the plant.

CHARGING AND DRAWING AND WORKING RESULTS.

We have got the coal delivered into the overhead storage hopper; and from there it is taken and dealt with by the first of

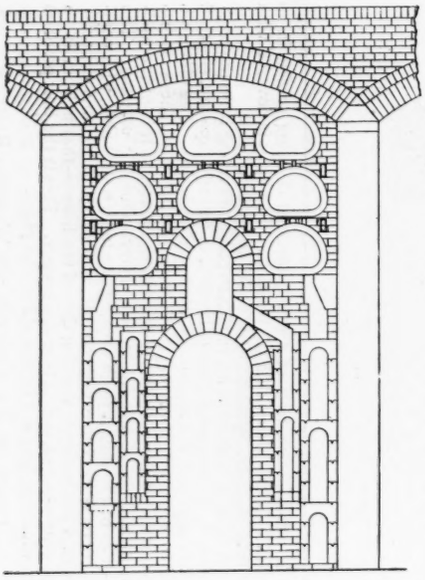


FIG. 10.—SECTION THROUGH FURNACE AND FLUES, SHOWING ARRANGEMENT OF SPECIAL TILES AND BLOCKS.

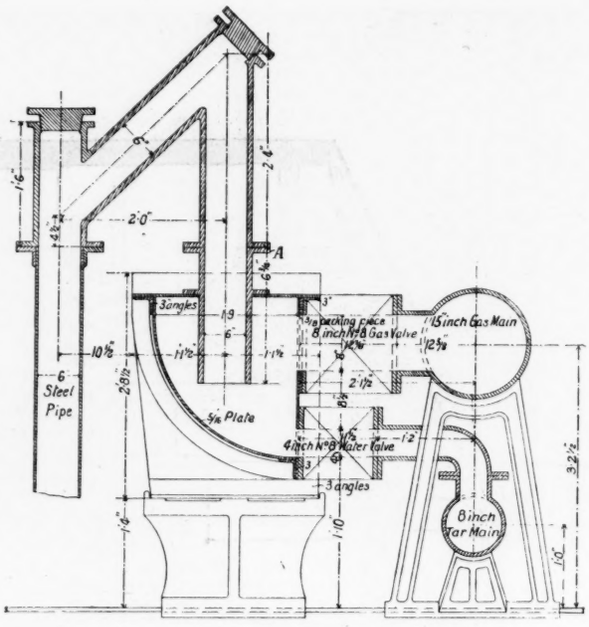


FIG. 12.—HYDRAULIC MAIN AND FITTINGS.

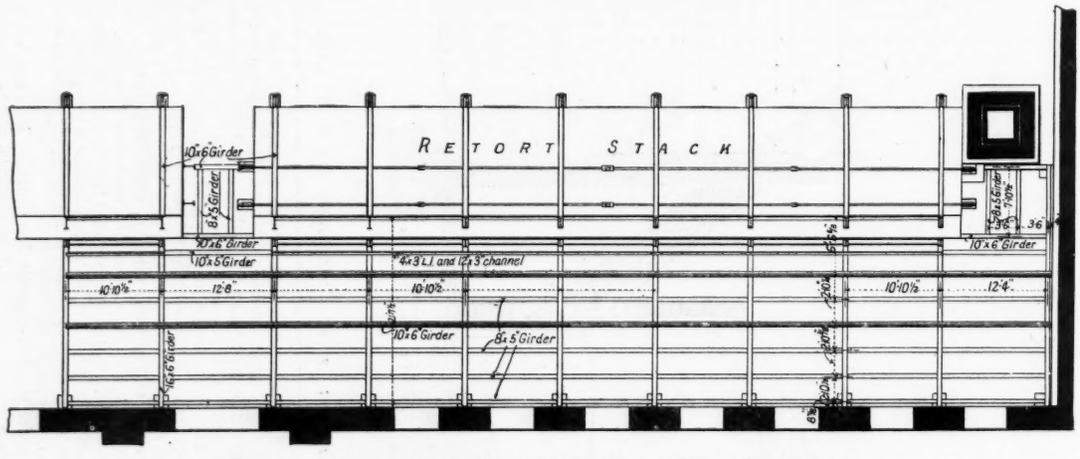


FIG. 11.—DETAILS OF THE RETORT-BENCH AND STAGE IRONWORK.

the newer type of West's combined charging and drawing machines, which it was our pleasure to describe in the "JOURNAL" for March 1 last, giving at the time some data as to the results. It was then stated that Mr. Lewis did not bind himself to the figures given; he preferring to have a somewhat longer experience with the machine before definitely committing himself to the work done and the cost. The six months, however, that have elapsed fully justify, it is a satisfaction to announce, the expectations then formed of the machine's capabilities. It does its work with the utmost ease and efficiency; the operations of charging and drawing being accomplished in the most perfect manner. The time of drawing and charging is entirely in the hands of the operatives; but, as stated in the former article, the actual time of drawing and charging a series of retorts does not exceed one minute each. The duration of the charges is 4 hours 48 minutes; half the retorts being drawn and charged every 2 hours and 24 minutes. From the beginning to the end, each round—inclusive of augering pipes, furnace feeding, and cleaning up on the completion of the round—occupies an average of 1·9 minutes per retort.

The following figures from the foremen's sheets for Aug. 22 show the actual time for each round:—

Time of Commencing Work (Aug. 22).	Time of Completion.	Time Taken. Minutes.	Retorts Charged.
6.0 a.m.	6.38 a.m.	38	20
8.20 ,,	9.0 ,,	40	20
10.45 ,,	11.20 ,,	35	20
1.10 p.m.	1.54 p.m.	44	20
3.30 ,,	4.8 ,,	38	20
6.0 ,,	6.42 ,,	42	20
8.15 ,,	8.55 ,,	40	20
10.45 ,,	11.27 ,,	42	20
1.10 a.m.	1.44 a.m.	34	20
3.30 ,,	4.8 ,,	38	20
		391	200

The time taken to do all the work in connection with the charging and drawing of 200 retorts in the twenty-four hours was 6 hours 31 minutes, or an average per retort of 1·91 minutes. The time absorbed in clinkering and pricking up the furnaces, cleaning out the fine breeze from the coke-water settling-tank, and scurfing the retorts as needed, brings the period of actual work on each shift to about six hours. This time may be slightly exceeded if any stopped pipes have to be cleared; but fortunately at Wellingborough they are rarely troubled in this way.

At the present time there are six beds or 48 retorts in use; and the total number of men employed in the manufacture of gas is—

Two stokers per shift, or four for the twenty-four hours, at 5s. 6d.	£1 2 0
One coal man (this man unloads all the coal received, and either elevates it into the storage hopper or deposits it in store)	0 4 7
Two boiler and exhauster men, at 5s.	0 10 0
Two foremen, at 6s.	0 12 0
Total wages per day	£2 8 7

The average quantity of coal carbonized per retort is 364 lbs. When an unscreened coal is being used, the charges are much heavier, and run up to nearly $3\frac{3}{4}$ cwt.; but as the bulk of the coal is now in the form of nuts, it is found that 364 lbs. is the average weight per charge. Since commencing to use the machine, the Company have bought on the average ten-thirteenths of nuts against five-twelfths formerly. But the productive results have been practically as good; and so the Company save on the purchase of the coal—of course, a very important consideration. The charges are thoroughly worked off; and the make of gas per ton is fully 11,300 cubic feet. The make, Mr. Lewis says, could be further increased if gas of a lower illuminating power than 16·2 candles was produced; but as the statutory obligation is 15 candles, the Directors have set 16 candles as the minimum quality of gas to be distributed. No enriching material is used. The average yield per mouthpiece is 9181 cubic feet, and per setting of eight retorts 73,450 cubic feet.

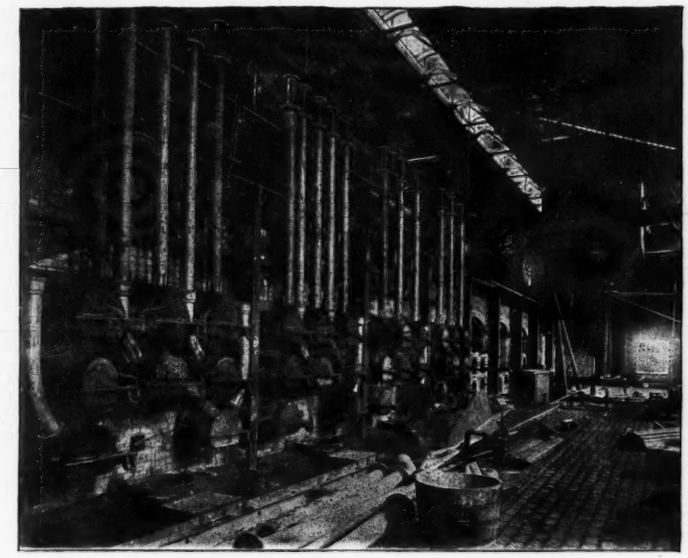


FIG. 13.—THE RETORT-SETTINGS AND STAGE-FLOOR UNDER CONSTRUCTION.

The minimum number of retorts in use this summer has been 40; the coal carbonized being 32 tons 10 cwt., and the gas made 367,000 cubic feet, per twenty-four hours. The cost for labour for the whole work, from unloading the coal to delivering the coke into either the storage hopper or coke-waggons, has been as follows:—

					Per Ton Carbonized.		Per 1000 Cubic Feet Made.
Four stokers at 5s. 6d.	£1	2	0	=	8·12d.	..	0·719d.
One coal man		4	7	=	1·69d.	..	0·149d.
Two boilermen at 5s.		10	0	=	3·69d.	..	0·327d.
Two foremen at 6s		12	0	=	4·43d.	..	0·392d.
	£2	8	7	=	17·93d.	..	1·587d.

The labour and wages were the same when seven beds, or 56 retorts, were used—the coal carbonized per twenty-four hours being 45 tons 10 cwt.; and the gas made 514,000 cubic feet. The cost was as follows:—

	Wages Paid.				Cost per Ton Carbonized.		Cost per 1000 Cubic Feet Made.
Four stokers	£1	2	0	..	5·80d.	..	0·513d.
One coal man		4	7	..	1·20d.	..	0·106d.
Two boilermen		10	0	..	2·64d.	..	0·233d.
Two foremen		12	0	..	3·17d.	..	0·279d.
	£2	8	7	..	12·81d.	..	1·131d.

Mr. Lewis estimates that this next winter the maximum working will be ten beds, or 80 retorts, carbonizing 65 tons of coal, and producing 734,000 cubic feet of gas in the twenty-four hours. The estimated wages will then be as follows:—

				Per Ton.		Per 1000 Cubic Feet Made.
Four machine men at 5s. 6d.	£1	2	0	5·90d.	..	0·513d.
Two assistants at 5s.		10	0			
One coal man		4	7	0·84d.	..	0·075d.
Two boilermen at 5s.		10	0	1·84d.	..	0·162d.
Two foremen at 6s.		12	0	2·21d.	..	0·197d.
				10·79d.	..	0·947d.

As the labour for working the whole of the fourteen beds of retorts will practically remain the same as given in the above statement, a very large decrease in the cost must take place in the future.

With regard to the carbonizing wages, there is an item which is not often taken into account, but which must affect the question—that is Sunday labour. At Wellingborough, for example, work is stopped after the 3.30 charge on Sunday morning; and there is no charging again until 6 o'clock on Sunday evening. But the wages of the boiler man and the man in charge of the works during Sunday are included in the wages for the week; and therefore these expenses naturally adversely influence the amount of wages paid per ton of coal carbonized.

THE COMPRESSED-AIR SUPPLY.

There is one other matter which must not be overlooked before leaving the stage-floor; and that is the question of the supply of compressed air to the machines. At four points in the length of the house, trumpet bends, with cocks, are placed; and to each is attached a flexible pipe with an instantaneous coupling for attachment to the machine. The flexible piping reaches about the length of four settings of retorts. This system has been adopted to dispense with the long lengths of hose and drums almost universally used in other similar power installations of charging and drawing machinery. Of course, this makes a big difference to the house, and to the cost of the plant.

Although out of place, it is convenient here to mention the air-compressing plant. The compressor is located in the exhauster-house, and is of the type specially designed by West's Gas Improvement Company, Limited, to supply air for their combined machine. The motive power is steam; the steam and air cylinder pistons being arranged on one continuous piston-rod, tandem fashion, The steam-engine is governed from the air-pressure in the receiver. Air is compressed in two stages in water-jacketed cylinders. The heat generated in the first stage of compression is abstracted by passing the air through the tubes of an intermediate cooler with unusually large water-cooled areas.

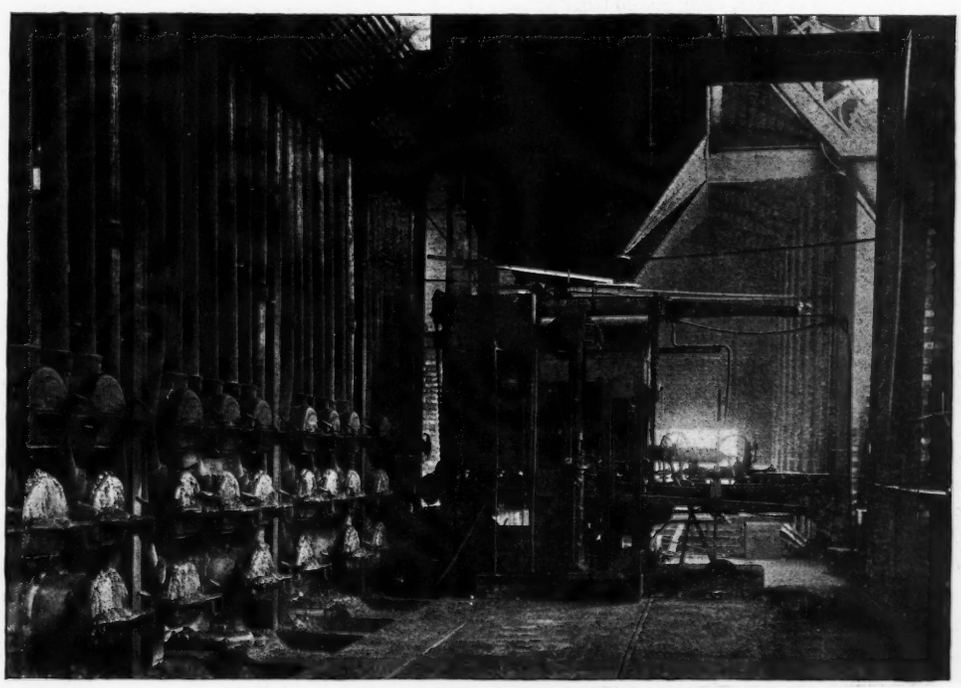


FIG. 14.—ON THE STAGE-FLOOR—THE WEST COMBINED CHARGING AND DRAWING MACHINE.

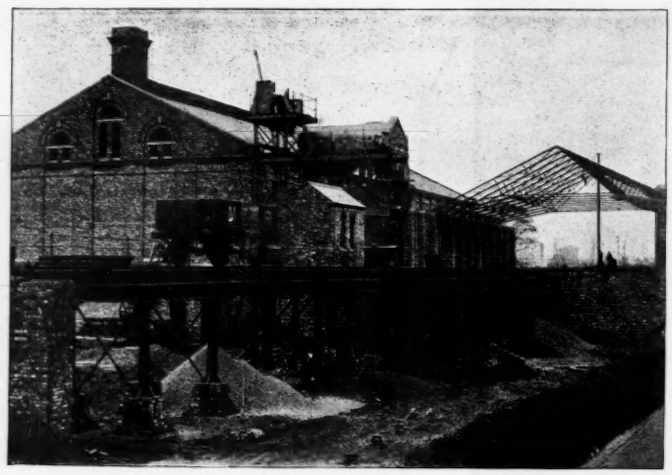


FIG. 15.—VIEW OF OVERHEAD RAILWAY, COAL-STORE, AND COKE PLANT TAKEN FROM THE RAILWAY.

A constant stream of cold water is kept running through both water-jackets and cooler, with the result that the efficiency of the compression process reaches the high figure of 82 per cent. The air-valves are of a special slide-valve type; the valves being operated by eccentrics on a side-shaft driven by machine-cut mitre-gear from the crank-shaft. The air passages and ports are made very large, which gives a good, well-defined shape to the indicator diagrams. Special attention has been paid to solidity of construction, allowance of large wearing surfaces, and efficient lubrication—all with a view to securing smoothness of working and length of life.

THE COKE PLANT.

This is the next feature to attract notice; and descent must be made to the ground floor to see the conveyor—it being a preference of the Engineer to have it below the stage rather than upon it. The coke falls through shoots in the floor; and it is of interest to observe that these are each fitted with a sliding plate, which can be removed in case of any temporary stoppage of the conveyor, and thus allow the coke to drop to the ground. In addition, the shoots are fitted with a hinged door, in order to check the rush of coke into the conveyor, which is of West's latest type. The trough, which is of steel, measures 2 ft. by 1 ft.; the return trough being bedded in the ground floor. The chain is of the heavy pattern which has of recent years been adopted by the makers, with tension gear at the north end of the house. The coke is quenched as it travels along the conveyor by means of water-pipes placed at frequent intervals—one of them, 8 feet long and containing a double row of holes, being placed longitudinally with the trough. The conveyor travels at the rate of 47 feet per minute; and the quenching is found to be very efficiently done. The water from the trough overflows down a shoot into a tank 8 ft. by 8 ft. by 3 ft. The fine coke dust settles here, and is removed from time to time; the water overflowing from the top of the tank into the drains. The experience at Wellingborough pronounces the conveyor as exceedingly simple, in working most efficient, and the wear and tear promises to be moderate.

The conveyor delivers into the boot of an elevator situated outside the southern end of the house. Measuring from the boot to the centre of the sprocket wheel, the height of this elevator is no less than 55 ft. $7\frac{3}{8}$ inches. In a vertical line from the ground floor, it is 52 ft. $4\frac{1}{2}$ in., which shows how small the inclination is. From the top, the coke is delivered through a shoot into a revolving-screen, 15 ft. 6 in. in length, and 3 ft. 6 in. in diameter. In the first place, the screen takes out the breeze, and then the coke of about 1 inch cube (which is sold as broken coke), while the large falls out of the end of the screen, and is delivered as required, either into the storage hopper, or direct through a shoot into waggons on the railway siding. In addition to the large coke-hopper, there are two others for the breeze and small coke. They are quite distinct; and their dimensions are: Breeze and small coke hoppers, each 10 ft. wide, 6 ft. long. and 18 ft. deep; large coke hopper, 10 ft. by 10 ft. by 18 ft. The two first will hold about 15 tons each; the last-named 26 tons. The plant is constructed entirely of steel; and is driven by a 10-horse power vertical steam-engine, housed in a separate building at the end of the retort-house. The coke arrangements, inquiry shows, have given nothing but satisfaction

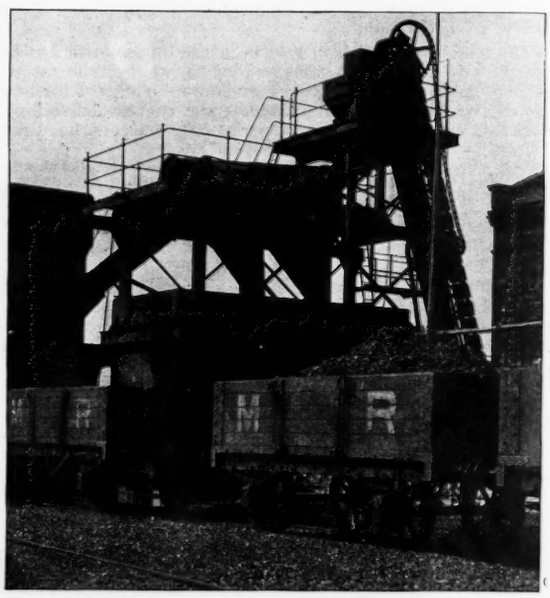


FIG. 16.—VIEW OF COKE PLANT FROM RAILWAY SIDINGS.
(The Top of the Pump-House is seen on the Left-Hand Side.)

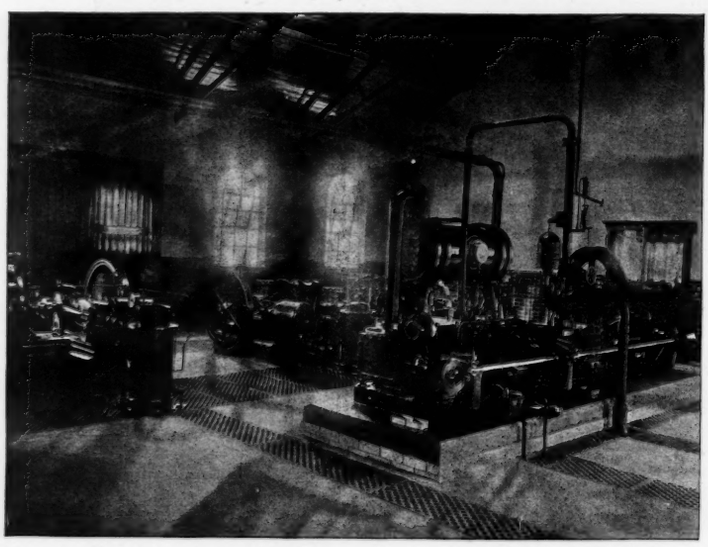


FIG. 17.—ENGINE-HOUSE, SHOWING EXHAUSTERS AND AIR-COMPRESSING PLANT.

to Mr. Lewis; in fact, the terms in which he speaks of it, from his few months' experience, are those of unqualified praise.

FROM CONDENSERS TO HOLDERS.

The part of the plant which from its magnitude, character, and working called for the most detailed description has now been disposed of; and to follow the gas to the holders is a far lighter task, though it has been an interesting and pleasurable duty to deal with plant so complete, and planned with such circumspection, that work must of necessity go forward in that methodical manner and with that ease which contribute, in addition to the plant itself, to economy. And economy, under any set of circumstances that may be ruling, is the end that justifies much of the expenditure on the modern equipment of gas-works.

From the retort-house, the gas is carried by an 18-inch main to the atmospheric condenser, which was removed from the old works. This consists of six tubes, each 24 feet long by 3 feet in diameter—the inner tubes being 2 feet in diameter. The gas is taken to the top of the condenser into the receiver; and from there it is distributed into one or more of the tubes as required—travelling down to the bottom receiver; so that the hot gas is always meeting a current of air. From the annular

condenser, the gas flows through a horizontal water-tube condenser (by Messrs. R. & J. Dempster) of a capacity of 1¼ million cubic feet per day. This consists of three tiers of 3-inch steel tubes placed at a slight angle in the cast-iron box. In these tubes, the gas has a travel of 52 feet; and it is found by Mr. Lewis to be a more efficient system than the vertical tube water-condensers. The condensers are fitted with Wright's circular dial thermometers; and it is seen that gas entering the annular condensers at about 120° Fahr., is reduced by them to 80°, and is then further brought down to 60° in the water-tube condenser. The water used for cooling in the water-tube condenser overflows into a tank in the boiler-house for feeding the boiler there. A slight increase of temperature is obtained, and there is no waste of water.

From the condensers, the gas passes through Waller exhausters, of which there are three, of respectively 35,000, 40,000, and 50,000 cubic feet per hour capacity. The two former are removals from the old works.

The next stage is to a Livesey washer of 2 million cubic feet capacity per day; and in this the last trace of tar is extracted. Passing onward, the gas next receives treatment in a pair of Messrs. R. & J. Dempster's tower scrubbers, each 8 feet in diameter and 45 feet high. The first is supplied through a turbine with ammoniacal liquor; and in the second clean water is employed—this being fitted with a Barker mill and water-distributor. The scrubbers are also from the old works.

Now we come to the purifiers, of which there are six, 20 ft. by 30 ft. by 5 ft. in size. The boxes are raised 9 feet from the ground-floor, and are fitted with shoots for the discharge of the purifying material (oxide is usually employed) to the revivifying-floor below. The supporting structure consists of brick walls and arches, cast-iron columns, longitudinal girders of 18 in. by 6 in. and cross girders 12 in. by 6 in., placed 5 feet apart. The roof is one which is being removed from the old works. From the purifiers, the gas travels to the meter-house, in which is one of Messrs. W. & B. Cowan's meters of 40,000 cubic feet capacity. This also formerly did duty at the old works.

From this point, the gas is conveyed, by an 18-inch main, to the old works, which now constitute the Company's storage station; the total capacity being 670,000 cubic feet, supplied by two holders—one of two lifts 110 ft. by 30 ft., and the other (a single-lift) 80 ft. by 20 ft.

A Distinct Feature.

All the pipes on the new works are 18-inch ones; and a distinct feature is that there is not a single syphon on the place that has to be pumped. All the receivers automatically overflow at such a level that no liquid remains in the mains. The liquid passes away, by an 8-inch main, into the tar and liquor separator; and from this into the tar and liquor tanks. There are two of these—each 30 ft. by 24 ft. by 21 ft. deep—situated in the south end of the works, just beyond the road that divides the engine-house block and the retort-house.

A Peep into the Remaining Blocks.

Having traced the course of the gas to the holders, we will take a rapid glance through the ranges of buildings which have only had their situation described, and, in doing so, refer to portions of plant which have not yet been touched upon. It will be most convenient to take the blocks in the order of their situation relative to the retort-house. Between the retort-house and the machinery (or No. 3 block) are found the annular and water tube condensers, a Claus sulphur-recovery chamber, and a purifier in connection with the sulphate of ammonia plant, as well as the latrines for the workmen. The third block is a range of buildings 212 ft. 4 in. long by 42 ft. 4 in. wide. These are constructed in a style to harmonize with the retort-house; but it presents a rather more ornamental appearance at the north end, facing the Union Road. The gable end has an arched top with lettered tympanum built of Derbyshire stone. The wording is: "Wellingborough Gaslight Company, Founded 1833;" and on a tablet below: "New Works erected A.D. 1902." This range of buildings is divided into seven rooms, consisting (starting from the north end) of the reading and meeting room 40 ft. by 20 ft. It is nicely decorated, and well lighted with end and side windows. Next comes the workmen's dining-room, 24 ft. by 40 ft. Both these rooms have a dado of glazed bricks, and coloured the same. The floors are composed of wood blocks. Succeeding we have a well-appointed lavatory, fitted with twelve basins, four shower-baths, and two ordinary enamelled steel baths—all having hot and cold water supply. There is also a range of 24 lockers here for the regular hands. The men, it is seen, have been well considered in their new working surroundings.

Following is the exhauster-room, which is 50 ft. by 40 ft., and which contains the exhausters and air compressors and receivers, all of which plant has been described. Likewise is here located a pressure register-gauge of the Parkinson and Cowan type, as well as a case containing a set of gauges for showing the pressures at different parts of the works. The decoration of this room deserves passing notice. There is a glazed brick dado; and the walls are of a delicate green shade. The roof is match-boarded; and the iron principals are painted green. Over all the pipes are cast-iron gratings; and the other parts of the floor are filled in with Terrazzo paving.

The boiler-house, which adjoins, is of the same size as the exhauster-room. This is filled with two Babcock and Wilcox boilers of 54-horse power each, which were removed from the old works, and one new boiler of 106-horse power of the same type. Two boiler feed-pumps of Tangye's make are also found here. It may be appropriately mentioned at this point that there is an abundant supply of water on the works, but it is very hard, and contains a considerable proportion of lime in the form of carbonate of lime and sulphate of lime, necessitating for the purposes of the boilers a water-softener. This is being constructed by Messrs. Babcock and Wilcox, and will be capable of softening 1000 gallons per hour—the water being treated with carbonate of soda. It is heated and boiled up by means of a steam jet; the solid matter falling to the bottom of the vessel in the form of sludge. The water is filtered before being passed into the boilers. From the boiler-house to the various engines about the works 4 and 3 inch steam-pipes are laid in a specially constructed underground trench, covered with wrought-iron plates. The steam is supplied at a pressure of 75 lbs. per square inch; but for the exhauster-house one of Hopkinson's patent reducing-valves is used for bringing the pressure down to 40 lbs. per square inch.

The sulphate-house and store complete the range of buildings. The former is 25 ft. by 40 ft., and is fitted with Messrs. R. & J. Dempster's ammonia liquor stills, superheater and liming vessel, and steam-pump, and one of the Chemical Engineering Company's open saturators for 3 tons of salt per twenty-four hours. The outlet of the stills is fitted with one of Wilton's patent discharging-valves; and the waste liquor is cooled down and run into the cellar. The waste gases are cooled in a water-condenser placed outside the building, and are burned in a closed kiln and passed into the previously mentioned sulphur-recovery chamber—any free sulphuretted hydrogen being taken up by the oxide purifier. In the sulphate-house are also found two ammoniacal liquor pumps for the purpose of supplying liquor to the hydraulic mains, Livesey washer, and the No. 1 scrubber, and also a Worthington pump for supplying clean water to No. 2 scrubber. The adjoining sulphate-store is large—measuring 18 ft. by 40 ft. This is to be boarded and lead-lined.

The Pump-House.

Water has been mentioned in the preceding paragraphs; and theretore at this stage we cannot do better than refer to the pump-house. It will be remembered that it has been stated that, at the old works, the water supply cost some £120 a year; and on the larger operations of the new works, the water requirement will be even greater. But through being able to secure water on the site, there will be a considerable saving in this respect—any way more, it is expected, than was spent for this purpose formerly. Storage for water is provided here by a tank of a capacity of 22,000 gallons, erected on a building some 34 feet above the ground-line, and adjacent to the railway sidings. Beneath the tank are placed two water-pumps of a special type by Tangyes, and having a united capacity of 18,000 gallons per hour. The water is obtained from a well between the building and the railway—the suction and delivery pipes both being of 5 inches diameter. The water-mains about the works are all of 6 and 3 inches diameter. Below the water-tank are also located tar-storage tanks for the purpose of loading tar into railway tanks; and, by this means, one of 9 or 10 tons capacity can be loaded in a very few minutes.

The Last Range.

We have already sufficiently noticed the meter-house; and there is but little to be said about the last range of buildings. It covers a space 316 ft. 9½ in. long by 19 ft. 3 in. wide. From the north end, the first room is the weighing and general office; and outside there is one of Pooley's waggon weighbridges of 10 tons capacity. Good roomy offices are those of the assistant and engineer and manager which follow; and they are fitted with every convenience. Next to the engineer's office is the laboratory, the fitting up of which is a matter for the future. Succeeding, we find a group of fine rooms—comprising fitting, meter, and cooker stores, the storekeeper's and testing room, and a general, paint, and oil store—all excellently and conveniently fitted with shelves and racks. These stores are very complete for works of this size; and they serve to emphasize the comprehensive manner in which the plans were laid by Mr. Lewis for these works. One feature is that the storekeeper is placed centrally among them; and from his room has internal communication with all the stores. In order, there follow fitters', machine, blacksmith's, and carpenter's shops.

The Contractors.

In dealing with the works, we have omitted to allocate to the Contractors their various parts of the works; and therefore we may remedy the omission before concluding. The West Gas Improvement Company put in the coal and coke plant, the drawing and charging machine, including the air-compressing plant. They also supplied the ironwork for the retort-house floor, the buckstays and the mouthpieces for the benches; but the Gas Company put in the settings. Messrs. R. & J. Dempster were responsible for the railway sidings, and supplied the hydraulic mains and connections, the water-tube condenser, the Livesey washer, and the roofs for the retort-house and coal-store, and sundry special castings. Messrs. Babcock and Wilcox supplied the boiler and water-softening plant. Messrs. George Waller and Co. undertook the exhauster work; and the steam-valves generally

were furnished by Messrs. Hopkinson, of Huddersfield. The fire-clay goods were supplied by Messrs. Hickman, E. J. & J. Pearson, B. Gibbons, Limited, and the Silica Company, and the Ewell bricks by Messrs. Stone and Co. The retort-house brickwork was executed by Messrs. E. Brown and Son, and that of Nos. 1 and 3 blocks by Messrs. Hacksley Bros.—both local firms. The railway waggons were supplied by Messrs. G. R. Turner, Limited, of Langley Mill. The Gas Company themselves did a large amount of work—the excavation and concrete work for foundations, and the brickwork of the coal-store, for the weighbridge, water-tower, coke-elevator, engine-house, meter-house, and latrines, as well as the retort benches and settings. The plant removals from the old works were also accomplished without any outside aid. The Company's Engineer, staff, and workmen, like the Contractors, have done their work well.

From the foregoing description and statements, we venture to think, the broad character of the enterprise of the Wellingborough Gas Company has been proved and fully justified; and there is no doubt that the future has in store for that enterprise a good measure of reward. But enterprise must be initiated; and the initiator of this the boldest step the Company have ever taken was their Engineer and Manager. To him must be ascribed the honour for that; and not only so, but for the skilful manner in which the works have been designed. They are complete to the smallest detail; and much originality is found in them. Their future working is in good hands; and we believe that, in the new works, there will be for the Company a fulfilment of the wish that an abundant prosperity may attend them.

THE GAS STOCK AND SHARE MARKET.

(For Stock and Share List, see p. 833.)

THE Stock Exchange has been occupied with the mid-monthly settlement, which was brought to a satisfactory conclusion on Thursday last. The speculative position proved to be very moderate; and as fortnightly loans were easily obtainable at 2¾ to 3 per cent.—the "carrying over" rates were lighter than on the previous occasion. The general trend of the markets has been favourable, owing to cheap money and the strong Bank return; the reserve now standing at £28,486,000, which is the highest total held by the Bank since April, 1897. There have been rather more investment orders on the market, which created a hopeful impression that business is going to mend. Consols, however, have not benefited, as they are lower on the week (at 88⅝) for the October settlement. The dulness is chiefly attributed to the fear of fresh loan issues in the present easy condition of the Money Market, and to the uncertainty regarding the situation in the Far East. Still, all markets closed with an upward tendency—especially investment securities—on the eve of Saturday's holiday. The Gas Market remains in a stagnant condition, and very little business has been recorded; the chief dealings being again in Gaslight ordinary stock between 93 and 94. Dealers have advanced the quotation to 93-95. The secured issues also met with a little attention at previous prices. South Metropolitan experienced a little inquiry, and stock changed hands at 126; but the last business recorded was 125. Among the Suburban group, Wandsworth and Putney stocks were advanced 2 per cent., with the exception of the debenture issue, which remains unaltered. As regards Provincial Gas Companies, Brighton and Hove and Hastings and St. Leonards are quoted *ex div.*; and making allowance for the interest, the value of the stocks is unaltered. British has again been inquired for; and the price improved ½. Among the Foreign Companies, European and Monte Video have each advanced ¼; but there was very little business recorded. There was a little dealing in Imperial Continental, between 200¾ and 202. In the stocks of other Companies, business was stagnant.

The daily changes were on a very moderate scale all through the week; the most activity being in Gaslight and Coke ordinary, which was dealt in at 93 on Monday, but realized 94 on Friday. Imperial Continental sold at 200¾ on Monday; but on Tuesday business was done at 202. Wednesday was a featureless day, and hardly any dealings were recorded; but Thursday showed some sign of activity. British rose ½; while there was more doing in Gaslight and Coke issues—the secured stocks as well as ordinary meeting with support. Brighton "A" ordinary was dealt in at 153, and South Metropolitan at 126. On Friday, Wandsworth and Putney, European, and Monte Video were quoted at an advance; while business was recorded in Commercial ordinary at 110, South Metropolitan at 125, and Gaslight ordinary at 94.

Masonic.—The voting papers for the ensuing elections for the Masonic Boys' and Girls' Schools having now been issued, subscribers to the charities are reminded of the claims to their consideration of the case of Violet Isabel Hunter (No. 10 on the list for the Girls' School), daughter of the late Bro. Robert Hunter, of Chester. A strenuous effort is being made to secure her election this year. Voting papers—for either the Boys' or Girls' Institution—may be sent to the "JOURNAL" office or to Bro. W. D. Child, Gas-Works, Romford, the Secretary of the "Evening Star" Lodge.

ELECTRIC LIGHTING MEMORANDA.

Nemesis—The Local Government Board's Stand Against Unsatisfactory Estimates and Municipal Imprudence—Replacements from Capital—Marylebone's Burden.

IT is now some years since that strong protest was made in these columns against the seductive reports sent in by consulting electrical engineers as to the prospects of electric lighting concerns in towns and areas of minor importance. Local authorities one after the other were blindly misled by the "prospects," and there appeared to be no higher authority competent, or if competent then willing, to stay their mad rush into adventure which, in the judgment of those with a closer intimacy of the subject, was enveloped in financial peril. On more than one occasion, we were taken to task over the question, and were accused of viewing it only through the spectacles of trading opponents. Time has justified, with greater poignancy than we expected, the position then taken up in these columns. Week after week, our electrical contemporaries give the financial results of some of these minor undertakings that were floated on glowing reports; and there is quite a shoal of them in which the word "deficit" comes out with a persistence that must be irritating to the credulous authorities and ratepayers of a few years since. We look down two facing pages of an electrical paper this week, and find on one a paragraph stating that Morecambe on the past year's trading, after meeting interest, sinking fund, and other charges, incurred a deficit of £1995, and on the other that Sutton Coldfield cannot make both ends meet by the sum of £997. A few weeks since we quoted several other examples; and many more could have been collected in the intervening time.

Rather late in the day, but "better late than never," the Local Government Board have commenced to look a little more carefully into these doubtful schemes, and to consider the question of the validity of the estimates placed before them by the consulting engineers. Earlier this year, they put "a spoke into the wheel" of the Stourbridge District Council, who were anxious to set up business in electricity generation, and, in effect, compelled them to take, in the interests of the ratepayers, the less hazardous course of buying what electricity they required from a power distribution company. But an even more wholesome lesson has just been administered by the Board in the case of the Wood Green District Council, whose area is supplied with gas by the Tottenham and Edmonton Gas Company, who, in conjunction with other large ratepayers and the North Metropolitan Electric Light Company, opposed the scheme of the Council at the recent inquiry by an Inspector of the Board. The amount which the District Council required to borrow for their project was £43,570. The scheme was one of the numerous progeny of Mr. Hawtayne; and what the Local Government Board thought of his predictions as to the future of the proposed concern, is found in their decision. On the information placed before them, the Board say they are "extremely doubtful" whether the scheme, if carried out, would be likely to prove a financial success. This is bad enough, but worse—for Mr. Hawtayne—follows. "The evidence given," observe the Board, "as to the probable demand for current was of an unsatisfactory character; for it was first stated that the demand was estimated to be equivalent to 330 consumers at 60 eight-candle power lamps per house; but when it was pointed out, and admitted by the Engineer, that the number of lamps estimated was far too high considering the class of property to be supplied, the estimate of the demand was altered to 660 consumers at 30 eight-candle power lamps per house. It does not appear clearly in what manner either estimate has been arrived at." No amount of comment on our part could increase the pungency of this criticism. It is regrettable, however, that the Board have so long held their peace and reserved deliberate action, because there is no doubt their procrastination has worked mischief that can never be repaired. But the Board do not leave the matter with their condemnation of Mr. Hawtayne and his estimates. They gave the District Council a piece of their mind—advising them to obtain more "reliable information," and telling them candidly that they do not think they are "acting prudently and in the best interests of their district in proposing to erect a generating-station for the supply of electricity." It would be an excellent thing if this letter from the Board to the Wood Green Council could be brought before the local authorities and ratepayers in the smaller towns who are ambitious to have electric-lighting undertakings of their own, as well as the authorities who are still waiting for that "something to turn up" which shall convert their deficits into the "profits" which were prophesied should be theirs long before the present, and which now appear more shadowy than they did when the foundation-stones of their generating-stations were laid.

The action taken by the Local Government Board has been kept in the background as much as possible by the weekly papers devoted to municipalization, and by our electrical contemporaries, excepting the "Electrician;" and the Editor of that paper has spoken out fearlessly and to the point. Not only does he hope that the decision of the Board will have a salutary effect in curbing the ambitions of small local authorities; but he points the moral that is to be drawn from the refusal of the Board to sanction the application of the District Council. It is that the more enlightened and broad-minded ratepayers of districts such as this do not interest themselves sufficiently in local politics. If they did, little

difficulty would be experienced in exposing the fallacious arguments which are invariably circulated as to the advantages of municipal supply. Among them, are the deceptive comparisons that are instituted, for the purpose of making a case, between such dissimilar places as these small towns and districts and rich and populous Liverpool and Glasgow. This is a matter which the "Electrician" condemns in unequivocal terms; and there is the ring of sincerity in the words used: "Having the interest of the industry at heart, we say, without hesitation, that the [Wood Green] municipal scheme was not for the good of the community in a district where the burden of the rates is already well above the average." Perhaps the action of the Local Government Board will enable Parliament to see that there is something after all in the plea of gas companies, who are large ratepayers, that they should be protected against unsatisfactory and unreliable estimates and municipal imprudence, such as one of the Government's own departments have, at length, felt themselves called upon to condemn.

This reawakening of the Board to the necessities of exercising their power of restraint, and looking more closely into the financial side of the schemes submitted to them, has brought to the surface again a matter which has been often emphasized, but which the financial condition of many electrical undertakings will not permit them to recognize unless made, as it should be, compulsory. This is the question of the expenditure on replacements of small units of plant by larger and more modern ones, and the entering (years before the expiration of the term for which the money originally spent on it was borrowed) of the whole expenditure of the replacement against capital, instead of charging the proper proportion to revenue. The "Electrician" calls attention to this laxity, and points out that local authorities who do this sort of thing are distinctly guilty of "watering" their capital. It is suggested that occasional reductions by the Local Government Board of the amount of the loans sanctioned would impress local authorities with the necessity of observing this point, and would ultimately lead to a better provision for depreciation and reserve funds. The present bad financial policy of many of these concerns must bring retribution sooner or later; and the longer the policy continues, the greater will be the disaster.

Touching upon the matter mentioned in the last paragraph, and showing the terrible mountain of electrical capital Marylebone is building up, it is noticed that the London County Council have sanctioned the borrowing by the Borough Council, for 42 years, of £340,405 for a generating station within the borough, subject to the Council "providing out of a sinking fund, or from maintenance account, for all renewals and replacements, during the currency of the loan, for plant, machinery, and works." It is also seen that £48,545 is required, and has been allowed (for 35 years), for bringing the existing plant into working order. Beyond this £44,850 has been granted, for ten years, for meters or alterations to existing meters consequent on the change of pressure. All these loans are in addition to the one of £1,212,000 already incurred to pay the Metropolitan Electric Supply Company for their Marylebone property and goodwill under the award. Poor Marylebone! These additional loans only represent £60,000 odd short of another half-million.

MUNICIPAL BORROWING AND ITS EFFECT.

ANOTHER example of the straits to which municipal authorities are reduced by the stringency of the Money Market was afforded by the action of the Plymouth Town Council last week. The Council are in urgent need of money to pay off their overdraft at the bank, and put the financial position of the town on something like the regular footing which the approaching Local Government Board audit necessitates. Time was when the Corporation could issue stock at 2¾ per cent., and when their 3 per cent. stock was quoted as high as 108 to 110. These happy days for municipal traders have gone—at least, for the present. It is no longer possible for the Corporation to go into the Money Market, and expect a rush of stock at the low rates of interest accepted five or ten years ago. Practically, municipal stock cannot be issued at all, except on terms which corporations regard as wholly prohibitive. The Plymouth Corporation were advised that they could not hope to raise money at less than 4 per cent., and that it was advisable to add a bonus to tempt offers even at this enhanced rate. The Corporation want £250,000, and propose to borrow it on the security of bonds to bearer repayable in five years, by which time it is no doubt hoped the Money Market may present a more favourable aspect. There is, of course, a direct loss to the Corporation of £2500 a year by the addition of 1 per cent. to the rate of interest. The bonus offered is a full six months' interest payable at the end of the present month, representing a sum of £5000. As Mr. J. A. Bellamy pointed out, these are considerations which ought to weigh very seriously with those who control municipal expenditure. Enterprises which look tempting and promise to be profitable when money can be had for the asking at 3 per cent. or less, wear quite a different face when the rate of interest jumps up to 4 per cent. and appears as if it might go still higher.

Although this higher rate of interest is a very serious matter to corporations carrying on trading operations which demand large and increasing capital outlay, it will be by no means an unmixed evil if it puts a check upon municipal expenditure. The enormous growth of local rates during recent years is one of the most grave factors of modern life. It was pointed out by the Chancellor of the Exchequer in his Budget speech last April that in the 22 years from 1880 to 1902 the rates levied in the United Kingdom had increased from £22,160,099 to £46,438,774. One of the results of this increase of the burdens which had to be borne by property was touched upon in the able address delivered at the recent annual meeting of the Auctioneers Institute of the United Kingdom, by the President, Mr. D. T. Alexander, of Cardiff. Referring to the growth of municipal indebtedness and the consequent increase of both rates and rentals in towns, Mr. Alexander said it was his experience that much greater difficulty is found now than formerly in letting and selling properties in town districts. In consequence of the heavy expenditure of the municipal authorities, assessments are everywhere increased, rates are advanced, rents are higher. The result is that there is not the same eager desire that there was some 15 or 20 years ago on the part of investors to put their savings into such properties. "I am old enough to recollect," said Mr. Alexander, "that there was formerly no difficulty whatever in dealing with any kind of town property. There was a brisk demand, and the difficulty was to find sufficient town property for investment. Now you have any number of properties, but comparatively few investors."

In country districts, the case is different. There, where the value of property is not affected by municipal administration, the old conditions still prevail, and the demand for property as investments has not fallen off. Mr. Alexander no doubt speaks in this matter from a local experience; but Cardiff and its neighbourhood are certainly not alone in feeling the effects of the tremendous growth of the rates and the ever-increasing burden of municipal expenditure. Another direction in which huge debts and high rates produce an appreciable effect in the experience of this auctioneer is in checking industrial enterprise. Those who control large manufacturing works know how heavily the weight of taxation presses upon them, especially in those towns where the craze for municipal undertakings has had most effect. Mr. Alexander traces to this cause the difficulty of inducing capitalists to embark upon new enterprises in districts otherwise suited to their purpose. There is no doubt reason to believe that in many cases the high rates of towns have an adverse influence upon their material prosperity and industrial development. It is, however, only right to remember that there are many things besides rent and rates which have influence with those who invest capital in new industries. Accessibility of markets, railway rates, proximity to the seaboard, the supply of labour and of raw material are all things which have to be considered in such cases. When these conditions are equal, it is, however, not the high-rated "Progressive" borough which is likely to be favoured; for the difference between high rates and low rates may mean all the difference between profit and loss.

LOW LIGHTING POWER AND MINIMUM PURIFICATION.

By H. LEICESTER GREVILLE, F.I.C., F.C.S.*

The above title is a brief expression of the text of Sir George Livesey's latest proposal to the consumers of the Crystal Palace District Gas Company, and upon which I wish to offer a few remarks. I may state at once that I am in favour of the new programme; but my reasons are not confined simply to those mentioned in Sir George's circular. The time is ripe for a full consideration of the whole question; and while putting forward no claim to treating such a large subject exhaustively, I hope to be able to offer a few comments of interest.

On the general aspect of the case, it appears somewhat doubtful whether the consumers get a proper *pro rata* reduction in price for a decrease of illuminating power from 16 to 14 candles. It is beyond dispute that the reduction so largely affects the available light from flate-flame burners that the reduction of price is far from due compensation. Against this, there is the fact that the economy available from incandescent lighting is practically unaffected. Then comes the question of the effect upon gas used for heating and power purposes. This is entirely a consideration of calorific value. There are many available statistics of the comparative values of gases of different illuminating powers as to their respective heating efficiencies; but my most available information is from the source I have already quoted in a recent article on "The Calorific Valuation of Gas."†

The mean calorific value of 16-candle gas was given as 652 B.T.U.; while that of 14-candle gas was 592 B.T.U. This is a decrement in heating value of 9·2 per cent. Expressed in money value, with 16-candle gas at (say) 2s. 6d. per 1000 cubic feet, the lower quality gas would be worth 2s. 3d. I do not remember that this reduction has been made; and the figures apply to pure coal gas. With carburetted water gas, the comparison would be even less favourable. Professor Boys has given 610 B.T.U. as the value of 14·6-candle gas (South Metropolitan coal gas); the

* This is the article referred to in Mr. Greville's letter published in the "JOURNAL" for Sept. 6, p. 669.—ED., J.G.L.

† See "JOURNAL," *ante*, p. 252.

Commercial gas of 15·2 candles gave 616 B.T.U.; and the Gaslight and Coke Company 616 B.T.U. for 15·5 candles. On the face of these figures, as the pure coal gas of 14·6-candle power was only 6 B.T.U. less heating value than the mixed water and coal gas of the Gaslight and Coke Company of a candle higher illuminating power, it seems to follow inferentially that a drop of illuminating value of two candles on a mixture of coal gas and water gas would have a more serious effect on calorific value than is the case with pure coal gas.

With regard to the effect of calorific value on the efficiency of the incandescent light, it cannot be too widely known that the incandescence of the mantle, and its consequent capacity for light emission, is not solely a question of the total heating value of the gas, but a function of *flame temperature*. This is a question of the volume and specific heat of the combustion products which are regulated by the initial composition of the gas. Plain water gas has a higher flame temperature than coal gas, though of a lower calorific value. If more attention were given to this point, lighting effects from incandescent burners would be obtained possibly differing from the data which are generally accepted. A proper and systematic study of the ratios of gas and air supply, height of flame, and area and size of mantle are the details necessary for study.

In addition to the supply of gas of comparatively low illuminating power, Sir George Livesey advocates the entire abandonment of lime in purification. This necessarily means that the carbon dioxide is left in the gas instead of being removed. The sequence of this is a reduction in the illuminating power; and I was certainly under the impression that gas engineers had for many years past formed the conclusion that the removal of carbon dioxide from gas by lime was a remunerative transaction, on the ground of increased illuminating power. The proportion of carbon dioxide in gas as it leaves the scrubbers is, in my experience, about 1 per cent. by volume. It has been generally assumed that the presence of 1 per cent. of carbon dioxide decreases the light by 6 per cent. (Clegg). According to Dexter, 2½ per cent. of carbon dioxide reduces 15·6-candle gas to 13·9 candles, equal to 1·7 candles. This is equal to 0·68 candle for 1 per cent. carbon dioxide. Therefore 15·6-candle gas would become 14·9 candles, a reduction of about 5 per cent. With carburetted water gas, the reduction is just about the same; 2·5 per cent. of carbonic acid reducing 18-candle gas to 15·7 candles, equal to 5 per cent.

The position therefore appears to be: An increase in gas made of 1 per cent. (say) 100 feet per ton, a reduction of light of (say) 5 per cent. in which 14·5-candle gas (purified) would be reduced to 13·8 candles (unpurified). This would be below the limit of a 14-candle standard. There would, in addition, be a reduction in heating value; but this would not be a material amount. Some advantage might possibly accrue in lighting value by the abolition of a constant succession of wet, cold masses of purifying material in the shape of slaked lime; but whether this would amount to a tangible quantity I have no data to form any opinion. There is also the material detail of the saving of cost of lime and labour. As the total cost of purification is generally given as less than 1d. per 1000 cubic feet, of which part is due to the use and manipulation of oxide, the saving by the disuse of lime must be something less than the gross cost of the total purification. Although spent oxide is a marketable commodity, the raw material has to be paid for, and a large amount of labour expended in the some dozen times which it has to be used and revivified before it acquires any market value.

The abolition of lime for purification naturally directs one's thoughts to other methods, especially liquid materials in closed vessels. It has always been a mystery to me that the original Hills process, with its modern developments by Claus, has not been more universally adopted. An alkaline compound ammonia produced on the works is equally as capable of combining with carbon dioxide and sulphuretted hydrogen as lime, and yet its functions are practically unutilized and undeveloped. What could be more simple than such plain operations as heating and cooling, and what more inexpensive? A moderate temperature of 160 to 180° Fahr. dissociates ammonium sulphide and carbonate, sulphuretted hydrogen and carbon dioxide are evolved, and a liquor containing free ammonia remains behind, only needing cooling to perform all necessary functions in purification. Cheap fuel replaces the cost of lime and oxide, and steam-pumps replace hand labour. It may be said that these statements are largely theoretical; but they are at least practicable. A few calculations will throw further light on the subject. A ton of ordinary gas coal will afford about 36 gallons of 8 oz. liquor. This would contain nearly 100 oz. of real ammonia (6·3 lbs.) Gas as it leaves the scrubbers may contain (say) 1 per cent. by volume of carbonic acid, equal to 814 grains, and about 500 grains per 100 cubic feet of sulphuretted hydrogen.

This calculates out per ton of coal (10,000 cubic feet of gas.)

CO_2	=	11·6 lbs.
H_2S	=	7·14 „

On the formula $(NH_4)_2 CO_3$, and NH_4, HS ammonium carbonate and ammonium sulphydrate the amount of ammonia required would be:

For the CO_2	=	9·0 lbs. (not quite).
H_2S	=	3·57 „
Total NH_3 required		12·57 lbs.

This is as nearly as possible twice the amount of ammonia afforded by a ton of coal; and it follows, therefore, that the treatment of the gas by twice the amount of prepared liquor produced from the coal would suffice for purification. As the liquor is available for use over and over again, the supply of raw material would be ample. Another advantage would accrue from this treatment. Most large works now manufacture their liquor into sulphate of ammonia and make their own sulphuric acid. The gases produced from the heating of the liquor would be available for burning and conversion into acid by the usual methods. The amount of acid thus procurable would be more than sufficient for the conversion of the liquor into sulphate, and would indeed yield a surplus. It has been shown that scrubber-gas may be said to contain sulphuretted hydrogen in the proportion of 7·14 lbs. per ton of coal carbonized. This on combustion and proper treatment would yield 20·5 lbs. of sulphuric acid. The ammonia in the liquor, 6·3 lbs., would require 18·1 lbs. of sulphuric acid, leaving an excess of the requirements of 2·4 lbs. In addition to this, there is the sulphuretted hydrogen in the liquor to be taken into consideration.

Taking this at 0·4 per cent., 36 gallons would contain 1·44 lbs., equal to 4·1 lbs. of sulphuric acid. This gives a total of 6·5 lbs. per ton of coal over and above what is necessary for the manufacture of sulphate of ammonia, and shows what a waste has been taking place in many works by the unscientific use of lime, whose main function should be solely the elimination of carbon dioxide. The sulphur from the coal would afford more than the necessary sulphuric acid for ordinary purposes, and yet a constant expense has sometimes been incurred in the purchase of spent oxide from outside sources. The advantage of the plan of separating the sulphuretted hydrogen from the gas in the gaseous condition, in place of its absorption by oxide, with subsequent burning of the spent material, is too obvious to require further comment here.

While on the subject of purification, I should like to mention two questions which I have raised in previous numbers of the "JOURNAL." Both apply indirectly to the manufacture of sulphate of ammonia; but I am not aware that my suggestions have had any practical result. One was the recommendation to cool down a proportion of the liquor from the still columns previous to liming, and to use this in the scrubbers in place of the usual clean water. The effect of this would be distinctly advantageous for three reasons—viz.:

1.—Minimizing the continuous contact of fresh water, with its capacity of absorbing useful hydrocarbons from the gas.
2.—A stronger liquor from the gradual accumulation of fixed salts of ammonia.
3.—Minimizing the amount of spent liquor from the sulphate works with the eventual disposal of which there is always more or less difficulty.

The last consideration is an important one, as it would probably mean a reduction of the volume of spent liquor of some 16 gallons per ton of coal carbonized.

My other recommendation was for works where water gas was manufactured, and headed "Gas Liquor as an Adjunct for the Purification of Water Gas." Figures were given which proved experimentally that the large proportion of carbon dioxide in water gas could be reduced by washing with ordinary gas liquor, the ammonium sulphydrate in the liquor being converted into carbonate with evolution of sulphuretted hydrogen. The treated liquor, on being dealt with in the sulphate plant, would simply afford carbon dioxide as a waste gas, which could be easily dealt with to avoid nuisance Finally, and certainly not the least of considerations, is that, should gas liquor replace lime and oxide purification, all the heat necessary for the treatment of the raw material could be obtained from the waste heat from the carbonizing plant, which is at present unutilized, but which could accomplish much if skilfully directed to proper channels.

The marriage was solemnized last Thursday week of Mr. A. P. DAWS and Miss MARGARET GRIMWOOD, younger daughter of Mr. and Mrs. C. W. Grimwood, of Sudbury.

Mr. PERCY GRIFFITH, M.Inst.C.E., has been appointed Consulting Engineer to the Broadstairs Urban District Council, and has received instructions to carry out some extensions at the water-works.

An informal gathering of the staff and workmen at the Warrington works of the Richmond Gas Stove and Meter Company, Limited, took place last Thursday, for the purpose of presenting Mr. J. F. DAVY, the late Manager, with some token of their esteem for him, on his leaving the Company to take an appointment with the Carron Company at Falkirk. The presentation took the form of a gold lever hunter watch and a silver rose bowl—the former being inscribed as the gift of the staff and employees to Mr. Davy, and the latter as being presented to Mr. and Mrs. Davy. Mr. J. A. Ransome, the Joint Managing-Director of the Company, asked Mr. Davy to accept the gifts as tangible evidence of the good-will of those he was leaving behind. He cordially wished him success in his new employment. Mr. Davy, in returning thanks, assured the donors that their gifts would be highly valued by himself and his wife, as representing the kind feeling he had been fortunate enough to engender during his six years' service with the Company, the continued prosperity of which he should always have at heart.

THE CONSUMPTION OF AIR BY INCANDESCENT GAS-BURNERS.

By HERR WINKLER, of Berlin.

[Abstract Translation from the "Journal fur Gasbeleuchtung."]

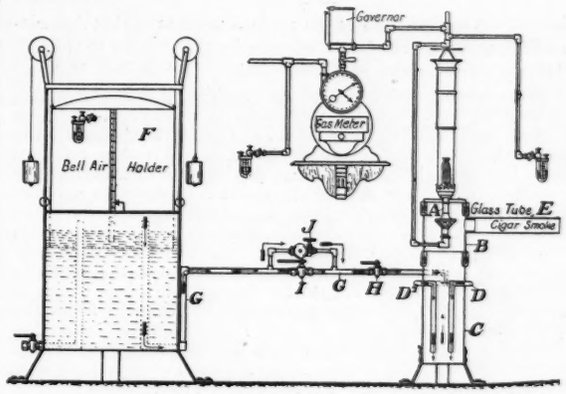
The author propounded as long ago as 1892 a question as to the amount of air admitted to the bunsen tube of the Welsbach burner; but at that time no satisfactory answer was forthcoming. Subsequently, however, technical men investigated the matter with a view of ascertaining the conditions essential to the realization of a favourable duty from the gas. At first, attention was mainly directed to the proper mixing of the air and gas, and the quantitative relations were ignored. Denayrouze was the first to point out, in one of his patents, that in particular there should be a definite quantity of air drawn through the burner-tube; and this quantity, he said, should be from four to five times the volume of the gas consumed in order that a relatively high illuminating effect might be produced. The correctness of this rule has been demonstrated in all later burners which afford a high duty from the gas in developing large sources of light.

It is obvious that the amount of air here considered must have been ascertained with the mantle fixed in position on the burner. Clearly, measurements of the air consumption of the burner, when it is not equipped with a mantle, must lead to some erroneous conclusions, as the smallest alteration of the conditions of a bunsen burner very greatly affects its behaviour. The researches of M. Sainte-Claire Deville on the "Dependence of the Illuminating Power of the Incandescent Gas-Light on the Calorific Power of the Gas,"* were, in fact, carried out with burners provided with mantles, except in so far as observations were made of the temperature or appearance of the uncovered bunsen flame. The illuminating power of the incandescent light is a function not merely of the calorific power of the gas, but also of the amount of air admitted to the gas in the burner-tube. Even the size, permeability, and shape of the mantle have a very marked effect upon the consumption of air; while the consumption of gas is, *cæteris paribus*, extremely little affected by the mantle.

The common assumption that the highest illuminating power is developed by the incandescent gas-light when the gas and air in the mixture are in the exact proportions required for complete combustion (*i.e.*, when they form "detonating mixture"), is purely hypothetical and erroneous. The author's and M. Sainte-Claire Deville's researches both show that the best results are attained with about 10 to 12 per cent. less air than is requisite to form the detonating mixture proper with the gas. This conclusion is opposed to the views expressed some years ago by Dr. Lux, who stated that, if more air was drawn in, the detonating gas mixture or flame was driven with greater force through the meshes of the mantle, owing to the elongation of the flame consequent on the presence of surplus air. These views referred to the Lucas lamp, the burner of which structurally presents nothing unusual, as its greater length and diameter correspond generally to its larger consumption. The accepted theory of what happens with this lamp finds expression in the views of Dr. Lux just quoted; but it rested always on a doubtful hypothesis.

A method of measuring the amount of air consumed beneath the mantle which has been devised by Dr. Rubens, Professor of Physics at the Technical College at Charlottenburg, has thrown light on the matter. The earlier researches of Dr. Lux were made on flames without mantles; and, moreover, the air was supplied to the mixing-tube by means of a blower, under a pressure above that of the atmosphere. The resistance offered by the mantle had not been taken into account, though actually the quantity of air drawn in by the gas jet is diminished by 6 to 11 per cent. with most burners when the mantle is placed in position. The resistance presented by the mantle is, however, greater when a larger quantity of air is drawn into the mixing-tube by means of an exhausting chimney, as has been described by Denayrouze. This resistance must be regarded as "harmful," as it hinders the effect of the chimney; whereas the resistance of the mantle referred to earlier may be deemed "beneficial." The "beneficial" resistance offered by the mantle to the upgoing gaseous mixture or bunsen flame serves for the production of light. The "harmful" resistance, which prejudices the suction of the chimney, hinders the propagation of the mixture of air and gas, and is not instrumental in producing or improving the illuminating effect. In those burners which function by means of a special chimney, the "harmful" resistance exceeds the "beneficial." For instance, the sucking effect of the chimney is diminished by 28 to 32 per cent. when the mantle is put in position, so that the total resistance offered then implies a loss of 34 to 43 per cent. of the air consumption. Such an effect produced by the mantle is surprising in regard to the consumption of air; for the consumption of gas is not very appreciably affected by putting the mantle in position. Hence errors arise at once if the air consumption of a burner is determined when it is not provided with the mantle.

The apparatus employed by the author for measuring the amount of air consumed by different burners is shown in the accompanying illustration. Its object is first to measure, and then to convey to the burner-tube, at a pressure neither above nor below the prevailing atmospheric pressure, the air required in the tube for the combustion of the gas—the tube being shut off meantime from the outer air. The lower part of the burner A is surrounded with a jacket B, which is shut off above from the outer air by a water-sealed lid, and is connected below by means of a water seal with an air-reservoir C, into which the measured air is introduced as nearly as may be at the bottom through the pipes D and D^1. The jacket B is provided at one side with a protruding socket, intended to receive a glass pipe E placed horizontally. Cigar smoke is introduced into this pipe, with the object of indicating that the pressures within and outside the jacket are the same. The air-meter F merely consists of a bell holder from which the air passes by the pipe G to the reservoir C. The pipe G is provided with a bye-pass with a micrometer regulating tap, by means of which the air supply can be controlled so that the slightest excess or deficiency of pressure in the reservoir B or C is indicated by movement of the cigar smoke in the glass tube E.



The method of using the apparatus is as follows: The lamp is lighted, while the tap H is wide open and the cocks I and J are shut, and it burns with air which passes in through the glass tube. The main cock I is then gradually opened, while cigar smoke is introduced into the glass tube until the smoke passes into the jacket at only very low velocity. The micrometer cock J is then gradually opened until the smoke in the glass tube attains a position of rest. The position of the air holder bell is then observed, and the consumption of air over a period of one or more minutes is ascertained. The gas consumption is, of course, measured simultaneously.

The mode of using cigar smoke for observing the equalization of the pressure was recently communicated to the author by Dr. Rubens. Prior to its adoption, the author determined the illuminating power of the lamp under its natural supply of air, and then subsequently gradually introduced measured air until the same illuminating power was attained. Assuming that the gas consumption remained constant, the measured air would amount to the same as the air introduced when the lamp was working naturally. As the air and gas are in every case measured by two different instruments, it is, as a rule, necessary to ascertain that they are in agreement, or what coefficient should be applied to correct the ratio. Using this method, the following figures were found for the consumption of gas and air with various burners:—

Test No.	Description of Burner.	Gas Pressure in Inches.	Gas Consumption. Cubic Feet per Hour.	Air Consumption. Cubic Feet per Hour.	Ratio of Gas to Air. 1 to
1	Genuine Welsbach, with mantle and 9⅞ inch chimney	1·18	4·87	15·0	3·08
2	Do. do. do.	1·63	5·82	19·3	3·32 (*a*)
3	Welsbach, 1901 pattern, with 10⅜ inch chimney	1·65	11·25	40·1	3·56
4	Do., but without chimney	1·65	11·32	37·3	3·28 (*b*)
5	Welsbach, 1902 pattern, with 9⅞ inch chimney	1·73	8·72	29·1	3·34
6	Greyson, complete	1·57	8·83	27·3	3·08*
7	Do. do.	1·85	9·89	35·8	3·62 (*c*)
8	Kohinoor, with Jena perforated chimney	1·46	11·11	33 8	3·04
9	Do., but without chimney	1·46	11·11	35·1	3·16 (*d*)
10	Haller, size 3, with mantle	1·42	23·30	95·7	4·10
11	Do., but without mantle	1·46	23·40	125·6	5·32
12	Haller, size 2, with mantle	1·50	15·52	63 2	4·06
13	Lucas, complete, with mantle	1·38	20·60	97·4	4·72

* 3·28 in the original, in which there is some discrepancy.

Remarks.—(*a*) (*c*) Increased gas pressure, and rise of relative air consumption. (*b*) Less air than with chimney. (*d*) More air than with chimney.

The results recorded in the table are the mean figures from a number of testings. It follows from them that the air consumption of an incandescent burner is by no means wholly dependent

* See "JOURNAL," Vol. LXXXIII., pp. 499, 567, 617.

on the construction of the burner, but depends as well on the gas pressure and the nature of the mantle.

The apparatus described may also be used to artificially raise the air consumption. For this purpose, the glass tube E is closed, and a surplus pressure is maintained in the air-holder B. It may thus be determined precisely what air consumption affords the maximum illuminating power with any burner. The author's measurements have shown that the highest illuminating power is attained when the ratio of air to gas beneath the mantle amounts to about 5·3 to 1. When the ratio rises to 6 to 1, the illuminating power is reduced. Broadly, the illuminating power was found, provided the above-named limit was not exceeded, to increase with the air consumption.

THE HINMAN STATION METER.

Among the papers read at the recent congress of Gas Associations of America at St. Louis, was one by Mr. Donald M'Donald, of Albany, on the much-neglected subject of "Station Meters." The paper was an extensive one, and went back to the beginning of things, so far as this class of meter is concerned. For the historical portion of the paper, Mr. M'Donald kindly and fairly acknowledged his indebtedness to "King's Treatise on Coal Gas." But when he came to latter-day work in connection with the station meter, there are few, if any, men in America who can speak with more authority than the author himself, for in an unostentatious manner he has had much to do with its development. The paper does not lend itself to abbreviation; and therefore we can only make from it one extract; and this refers to the Hinman drum. No excuse for limiting ourselves to this is required when Mr. M'Donald states that the original ideas and improvements contained in this wet meter constitute what has proved to be "the greatest advance in the correct and economical measurement of gas by station meters since the introduction of the three-partition drum." Proceeding, the author says:

The case of the meter is of the usual form; but the effective length inside is increased by discarding the registry sinkage and shortening the dry well-box. The drum is the same in principle as Crosley's, and has four partitions, differing from it by more completely utilizing the space in the meter case, thus passing more gas per revolution, and in offering less resistance to the water when rotated—thus allowing a greater speed of rotation at constant loss of pressure.

The space in the case is more completely utilized by making the drum larger, and placing four wings at each end in a plane perpendicular to the shaft, by using a comparatively flat hood or hollow cover, a flattened dry-well, and by forming pockets open to the interior of the drum in the space under the hood, by means of which the space formerly devoted to the hood, and which did not measure, is largely reduced, and the space so gained is devoted to measuring purposes. Besides being lengthened at both ends, use is made in this drum of eight triangular, pyramidal spaces, four at each end of any drum of Crosley's type—each space having for two of its sides the surface of the water, and for another side one of the divisions of the drum.

The less resistance of the Hinman drum to rotation in the water, so far as it is affected by its shape, is due to the fact that the average angle (which the divisions of any drum with a flat slant partition make with the water as the drum rotates) is much larger than the average angle made by the divisions of the Hinman drum. The peculiar shape of the drum—allowing also an increase in the size of the waterways without a consequent reduction in capacity—gives an added ease to rotation.

In any wet meter drum, the force which makes it rotate is proportional: To the difference of the pressure of the gas on two sides of a division, to the projected area of that portion of the division above the water, and to the average distance of the surface on which the pressure is exerted from the axis of rotation. The Hinman drum as compared with other types has a larger projected area, and, what is of particular importance, this area is at a greater average distance from the axis. It is impossible to give the exact theoretical value of each of these changes; but the figures given further on in the paper show the practical advantages to be gained by the use of the drum. In a general way it may be said that the Hinman drum as constructed to-day will run at about 50 per cent. greater periphery speed than the Parkinson type at a given loss of pressure. In addition to this, a gain has been made, as has been explained, in the capacity per revolution; this gain being proportionally greater in the larger sizes.

Another point that should be mentioned in passing is that, by reason of the peculiar position of the partitions in this drum, it lends itself readily to an extremely strong form of construction, so that it is possible to guard against the effect of the stresses resulting from rotating it at a high periphery speed. The results obtained by the use of this drum are so far ahead of anything heretofore obtained, that it may be interesting to compare the results with what might be theoretically possible. A large Hinman drum recently constructed passed in one revolution about 70 per cent. of the total capacity of the case, which, taking into consideration the fact that it is necessary to have some space utilized as a gas-way, is within 10 per cent. of the theoretically possible cubical contents of the case that can be utilized for measuring purposes. This shows that there is very little advance possible over the Hinman type of drum in the amount of gas that can be delivered per revolution. The speed of revolution of a wet-meter drum would seem to be limited only by practical considerations, and that there is no theoretical limit available. It should be remembered, however, in this consideration, that the resistance to rotation increases at least as fast as the square of the increase in speed; and bearing this in mind, the very great increase of speed of rotation of this drum was very much more of an achievement on the part of its inventor than was the increase which he gained in capacity.

Capacity of the Hinman Station-Meter in Cubic Feet, with One Inch Loss.

Size.	Per Hour.	Per 24 Hours.	Usual Size of Connections.
4 ft.	8,000	192,000	8-inch
4 ft. 6 in.	11,250	270,000	8 ,,
5 ft.	14,500	348,000	8 ,,
5 ft. 6 in.	18,000	432,000	10 ,,
6 ft.	21,750	552,000	10 ,,
6 ft. 6 in.	25,750	618,000	12 ,,
7 ft.	30,000	720,000	12 ,,
7 ft. 6 in.	35,000	840,000	12 ,,
8 ft.	40,000	960,000	12 ,,
9 ft.	51,000	1,224,000	16 ,,
10 ft.	63,000	1,512,000	16 ,,
11 ft.	77,000	1,848,000	16 ,,
12 ft.	92,000	2,208,000	16 ,,
13 ft.	109,000	2,616,000	20 ,,
14 ft.	128,000	3,072,000	24 ,,
15 ft.	150,000	3,600,000	24 ,,
16 ft.	173,000	4,152,000	24 ,,

The Manchester and District Junior Gas Association will meet next Saturday, when, by permission of Mr. Henry Green, a visit will be paid to the Preston Gas-Works.

International Exhibition at Liege.—Arrangements have been made for holding an International Exhibition at Liège next year; the opening ceremony to take place in May. Belgium has invited all the other nations to take part in it; and, among others, France has accepted the invitation. Class 75 in group XII. will include lighting appliances other than those in which electricity is employed; and a Committee has been formed, with M. Cornuault as President, M. Mallet as Vice-President, and M. Fourchotte as Secretary, to take the necessary steps for ensuring a good representative exhibit.

Society of Chemical Industry.—The annual general meeting of the Society commenced in New York on the 7th inst. with an informal reception at the Chemists' Club. The next morning, a meeting of the Council was held in the Havemayer Hall, at the Columbia University, after which the general meeting was opened in the Gymnasium of the University—Sir William Ramsay, the retiring President, occupying the chair. Mr. W. H. Nichols having been elected President for the ensuing year, Sir William Ramsay delivered his Presidential Address, which was devoted mainly to the subject of the education of the chemist. The annual dinner was held in the evening, at the Waldorf-Astoria Hotel. Among the visits included in the programme was one to the works of the Consolidated Gas Company at Ravenswood, Long Island. On Monday last week a number of the members left New York for St. Louis.

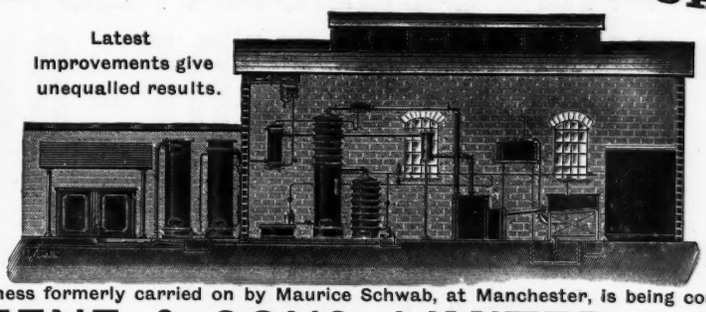
A Gigantic Pumping Scheme.—We have received from Messrs. James Simpson and Co., Limited, an illustrated pamphlet giving "A History of the Goldfields of Coolgardie and Kalgoorlie Water Supply Scheme," for which they obtained the contract for the pumping machinery, including 20 high-duty Worthington engines and a similar number of Babcock and Wilcox boilers, &c. The scheme, which was devised by the late Mr. C. Y. O'Connor, provides for a supply from the coast of 5,600,000 gallons of water per 24 hours; and the estimated cost was £2,500,000, exclusive of the reticulation of the towns on the line of pipe. Messrs. Simpson were allowed 27 months in which to execute their contract; and they are to be congratulated on the fact that it was completed without accident. We hope to give in an early issue a few particulars of what is justly claimed to be the greatest pumping scheme ever carried out.

Eastern Counties Gas Managers' Association.—As announced in the "JOURNAL" for the 6th inst., the Eastern Counties Gas Managers' Association will meet on Thursday, at Boston, under the Presidency of Mr. J. S. Dougall, who will deliver his Inaugural Address. There will also be a paper by Mr. F. Paternoster, of Felixstowe, on "A Few Difficulties Associated with the Supply of Gas to a Rapidly Increasing District." By the kindness of the Chairman and Directors of the Boston Gas Company, the members will be entertained to light luncheon at the White Hart Hotel, after which an adjournment will be made to the board-room at the works, where the meeting will take place. Arrangements have been made for visits to the Municipal Buildings and other places of interest at the conclusion of the business. The members and friends will then dine at the Assembly Rooms; and the following day there will be an excursion to Skegness.

MAURICE SCHWAB, FORMERLY OF MANCHESTER.

Supply and Erection of Tar-Works, complete Bye-Products Recovery Plant, Ammonia and Acid Plant, Injectors, Acid Valves, Cocks, &c.

Latest Improvements give unequalled results.



SULPHATE OF AMMONIA APPARATUS OF THE MOST MODERN CONSTRUCTION. Solid Plate Lead, or Wood, lead-lined SATURATORS.

The Business formerly carried on by Maurice Schwab, at Manchester, is being continued by

H. GREENE & SONS, LIMITED, LONDON.

Under the Management of Mr. Schwab.

Telegraphic Address: "Owston, London." Telephone: 1693 Hop. Registered Offices: Surrey Engineering Works, Blackfriars Road, London, S.E.

NEW PATENT GOVERNORS

DOWN CURRENT.

FOR Inverted AND Ordinary

INCANDESCENTS.

UP CURRENT.

BRUCE PEEBLES, LTD., EDINBURGH.

EXHAUSTING MACHINERY.

Oldest Makers of High-Class Exhausting Machinery of all Capacities and for all Purposes.

WALLER'S PATENT 3 AND 4 BLADE EXHAUSTERS

Require less Steam and maintain a steadier Gauge than any other type.

OVER 1000 SUPPLIED.

WALLER'S PATENT "COMBINED" EXHAUSTING SETS FOR SMALL WORKS.

With Steam or Gas Engine, and all Accessories self-contained on one base plate. From 500 cubic feet to 10,000 cubic feet per hour.

SPECIALLY DESIGNED EXHAUSTER SETS FOR WATER-GAS PLANTS.

EXHAUSTING MACHINERY FOR BYE-PRODUCT PLANTS.

COKE-BREAKING MACHINERY.

TAR, LIQUOR, AND WATER PUMPS.

GEORGE WALLER & SON,

165, QUEEN VICTORIA STREET, LONDON, E.C.

Works: Phœnix Iron-Works, Stroud, Gloucestershire.

Telegraphic Addresses { London: "Weighbeam, London." / Stroud: "Waller, Brimscombe." }

Telephone Numbers { London: 2420 (P.O.) Central. / Stroud: 210 Brimscombe. }

Agents for Scotland: D. M. NELSON & Co., 53, Waterloo Street, Glasgow.

THE CELEBRATED

N.N. EWELL FIRE-BRICKS

Have been used for upwards of 100 Years, and are

SPECIALLY ADAPTED

for those portions of

RETORT FURNACES AND SETTINGS

WHICH ARE

EXPOSED TO HIGH TEMPERATURES.

MANUFACTURED BY

STONE AND COMPANY, LIMITED,

NONSUCH FIRE-BRICK WORKS,

EWELL AND EPSOM.

Telegrams: "STONE, EPSOM."

THE "TUNBRIDGE WELLS" GAS-LAMP

FOR KERN BURNERS

With Bye-Pass Lever Cock on Top. Patent.

EVERY LAMP PERFECT AND GUARANTEED SHADOWLESS.

Adopted by various Gas Companies.

Unsurpassed in **Illuminating Power, Economy, Durability, and Simplicity.**

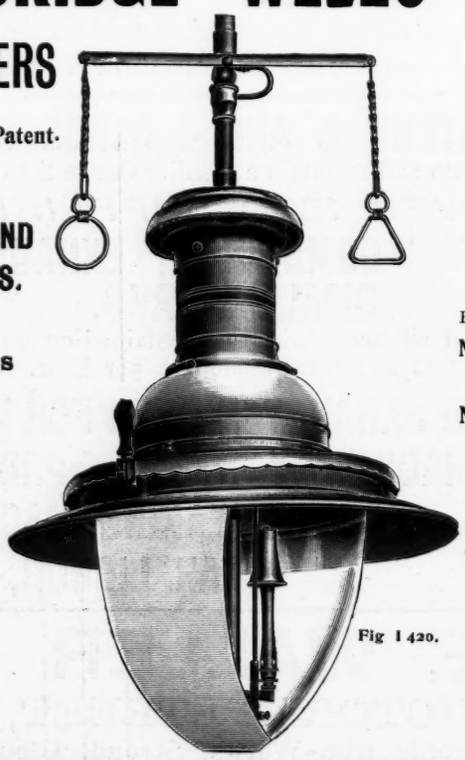


Fig 1420.

Enamelled in the following colours:—

WHITE AND GOLD.
BLACK AND GOLD.
BROWN AND GOLD.

Extra Glass.

No. 5024, Opal and Clear Shade (Vertical).

No. 5041, Clear Glass Shade.

Patent Storm-proof Lamp with 18-inch Reflector and Pilot Light Tubes for Two Size 3 Kern Burners.

PRICE LISTS ON APPLICATION.

MANUFACTURED BY

GUEST & CHRIMES, FOUNDRY AND GENERAL BRASS WORKS ROTHERHAM.

THE PROVAN WORKS OF THE GLASGOW CORPORATION.

SECOND ARTICLE.

[With this Issue are published Three Plates, completing the Series referring to the Retort-House and Coal-Stores.]

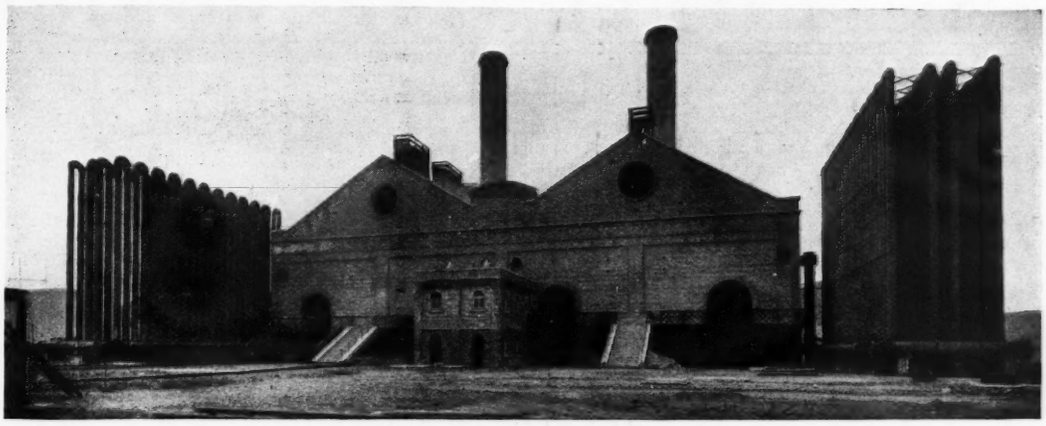


FIG. 19.—WEST END OF THE RETORT-HOUSE, SHOWING THE ATMOSPHERICAL CONDENSERS.

THE retort-house and coal-stores with their interior plant and exterior appurtenances were treated upon in the first article; and in this second one it is intended to indicate the character of the buildings and plant through which the gas passes in its travel to the gasholders.

ATMOSPHERIC CONDENSERS.

At the east end of the retort-house, two extensive sets of atmospheric condensers are placed—one on either side of the house, as shown in the first photograph. Two capacious tar-tanks form the foundations. We learn that each of these is 70 ft. 3 in. long by 17 ft. broad, and is built of brickwork in portland cement mortar. The top of each tank is formed of two semi-circular arches, 64 ft. 3 in. long by 7 ft. 6 in. wide, and 18 inches thick, resting on the 3-feet thick side walls, and on a 2-feet thick centre wall. In the centre wall are four semi-circular arch openings. The bottom of each tank is formed of a bed of concrete 2 feet thick, resting on a layer of clay puddle, 15 inches thick; but an 18-inch thickness of puddle has been carried up with the walls, in order to make them thoroughly water-tight. Concrete was laid over the arches to the level of the crown of the brickwork; and then completely over the tanks a bed of concrete 18 inches thick was laid, having recesses provided in it for the tar and seal boxes. On the top of this bed are the three foundations for the condensers, each consisting of a course of brickwork built in portland cement, 61 ft. 6 in. long—the middle one being 6 ft. 9 in. wide, and the two outer ones each 3 ft. 8 in. wide. On these foundations are built thirteen walls, each 14 in. high and 9 in. broad, and 6 ft. 2 in. and 3 ft. 1½ in. long respectively, having a stone capping 12 in. broad by 7 in. thick the full length of the piers. These carry, for each condenser chest, two steel beams of I section, 3 in. by 3 in., and 61 ft. 3 in. long.

Now we come to the condensers themselves; and it is noted that each set is subdivided into four sections, each composed of a row of 24 18-inch mild steel pipes, 45 feet long, made up of three 15-ft. lengths. The pipes are braced together, and at their tops are connected by semi-circular bends of 18 inches inside diameter, while the lower ends rest on a cast-iron chest 2 ft. 6 in. inside diameter. Each section of chest is 5 feet long (except the two end ones, which are 5 ft. 1½ in. long), with a ¾-inch thick partition cast in the centre. The top of the chest is fitted with branches of the diameter of the upright pipes; and each section also contains two openings for cleaning (with cast-iron doors), and overflow branches, which dip into a seal-box 3 ft. 6 in. deep, 2 ft. long by 9 in. wide inside measure, with an overflow spout 2⅓ inches deep. The cover at each end of the chest has an 18-inch branch cast on, and fitted with the necessary valve. A 5-inch overflow tar-pipe is laid in the wide space between the boxes, with branches (each having a 3-inch bell-mouthed bend) to receive the tar from the seal-boxes. The makers were Messrs. Clapham Brothers.

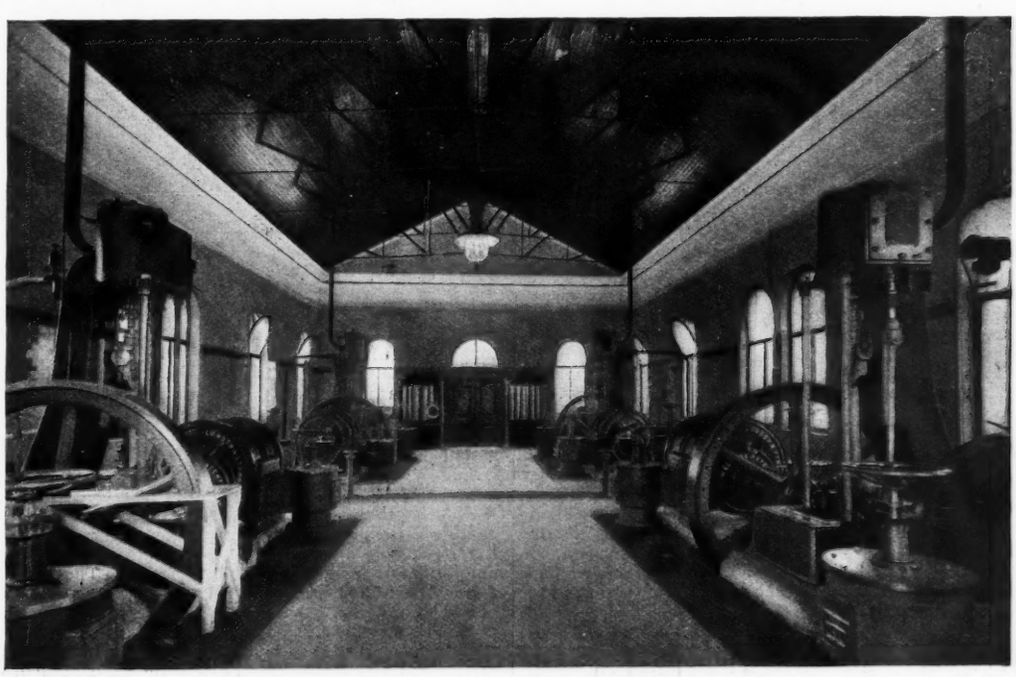


FIG. 20.—VIEW OF THE EXHAUSTER HOUSE AND PLANT.

Exhausters.

In dealing with these sections of the plant, it is unnecessary to indicate their relative positions on the site, as readers can ascertain this for themselves from the ground plan published as a plate last week. From the condensers, we pass to the exhauster-house which (taking inside measurements) is 60 ft. long by 30 ft. wide, and 18 ft. 4 in. high from the floor to the seat of the principals. The floor is raised 4 feet above the yard-level, and a lower floor is some 2 ft. 6 in. below the yard-level. A bed of concrete, 3 ft. 6 in. wide and 15 in. thick, forms the foundations. To the top of the base course (which is of stone) the walls are 2 ft. 4½ in. thick, and above to the underside of the wall plates, 2 feet thick. A branching-out into rather more ornamental architectural features than are found in the retort-houses and coal-stores is seen here. All the doors and windows are built with stone facings projecting ¾ inch beyond the brickwork. The east front has a door 11 ft. 6 in. high by 5 ft. wide, approached by a double flight of steps, and two windows 7 ft. 10½ in. high by 3 ft. 6 in. wide; and both doors and windows have ornamental stone lintels and corbels. There are also other features which add to the decorative appearance of the front. The west front has also a door and windows; and the panelled side walls have windows with stone mullions. The roof is supported by eight principals at 6 ft. 8 in. centres, formed of tees and round rods, resting on and bolted to the walls. The other ironwork is of a simple character. The roof is covered with slate, with a wooden lining. The house is spacious and light; and its interior finish is pleasing. The arrangement of the plant will be seen by the photograph. The exhauster foundations are formed of concrete, finished by large stones 15 inches thick under the exhausters, and 17 inches thick under the engines. Altogether, there are eight exhausters (made by Messrs. George Waller and Son), in four sets of two; each pair being coupled direct to a vertical steam-engine. Each exhauster is capable of passing 120,000 cubic feet of gas per hour, or each set 240,000 cubic feet, at a speed not exceeding 80 revolutions per minute.

Water-Tube Condensers.

Passing the exhausters, we come to the water-tube condensers. There are four of these, and they were made to meet the requirements of Mr. Foulis by Messrs. Kirkham, Hulett, and Chandler, Limited. He prescribed that each of them should be capable of reducing the temperature of 3 million cubic feet of gas per twenty-four hours, from 100° to 60° Fahr.; the temperature of the water supply being 50° Fahr. The condensers are of the vertical type.

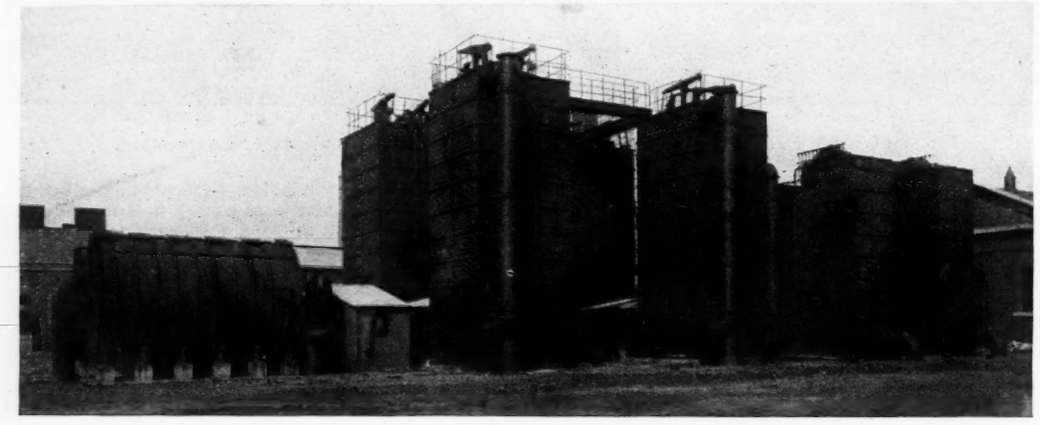


Fig. 21.—Scrubbing and Washing Plant.

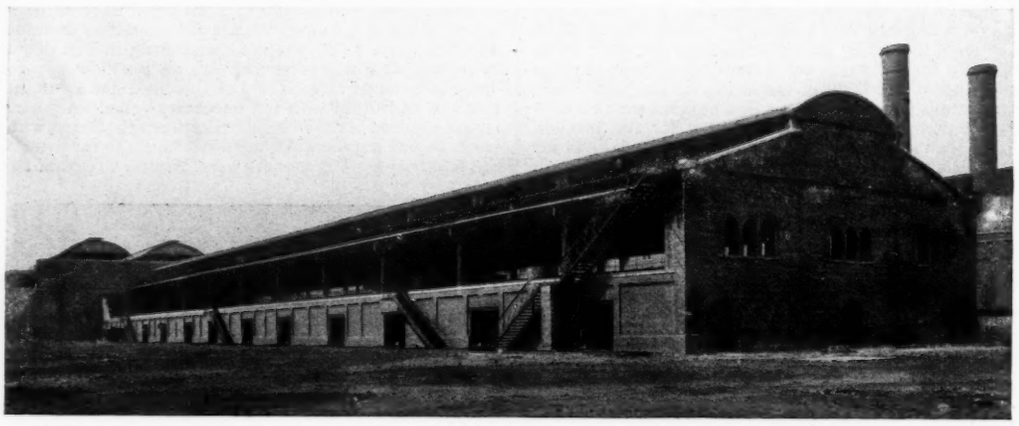


Fig. 22.—General View of the Purifier-House.

The pipes through which the cooling water flows are 4 inches internal diameter; and all the pipes were proved by hydraulic pressure to 75 lbs. per square inch. Openings for cleaning and inspecting the condensers are provided; and there are means of access for examining the pipes both internally and externally.

Ammonia Scrubbers.

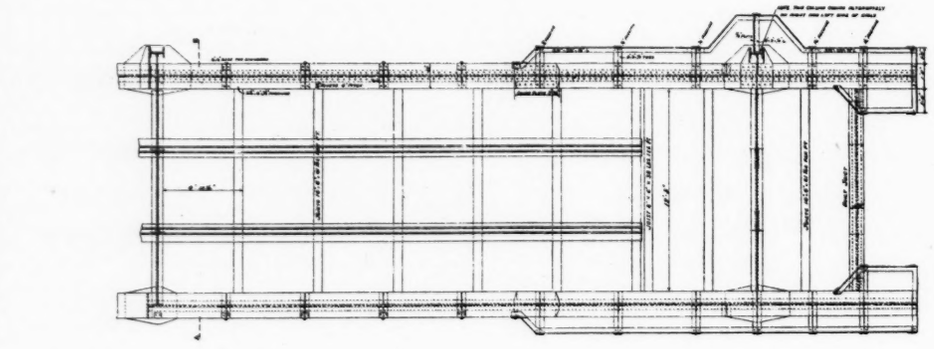
The ammonia scrubbers next fall for notice; but, when it is mentioned that they were made by Messrs. C. & W. Walker, Ltd., there is little left to be said. There are four of them; and each is capable of extracting the whole of the ammonia from 3 million cubic feet of gas. A tar-extractor is fitted to each, together with the necessary gearing and steam-engine. It was specified by Mr. Foulis that the total pressure caused by both the tar-extractor and scrubber should not exceed 3 inches when passing the full quantity of gas.

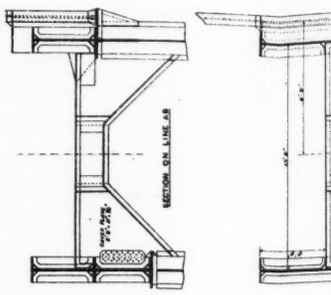
Rotary Scrubbers.

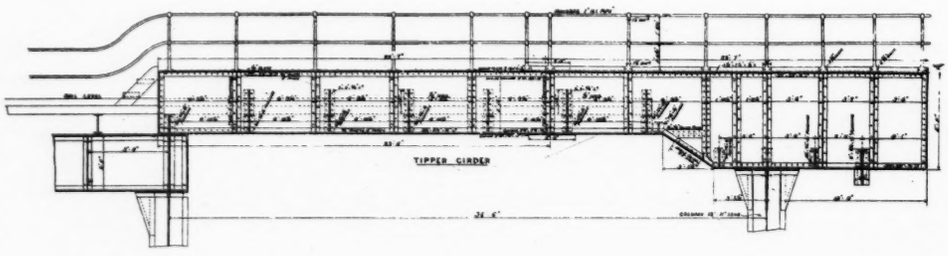
Turning to the rotary scrubbers, it is found that they are of Messrs. W. C. Holmes and Co.'s make. There are two of these; and they have each a capacity of six million cubic feet. The recovery of cyanogen is, it seems, going to be carried on at Provan; but these rotary scrubbers at the moment represent the sole portion of the cyanide plant erected. Dawsholm is the only station of the Corporation at which cyanogen has been extracted hitherto; and now it is proposed to treat all the gas in the first section of the Provan works for its recovery. The system of recovery adopted by the Glasgow Gas Department is said to work extremely well.

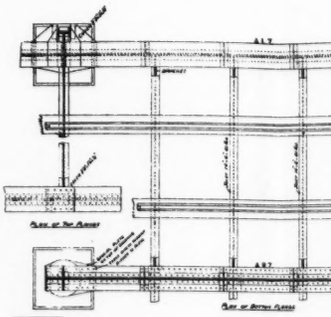
The Purifier-House, Lime-Stores, &c.

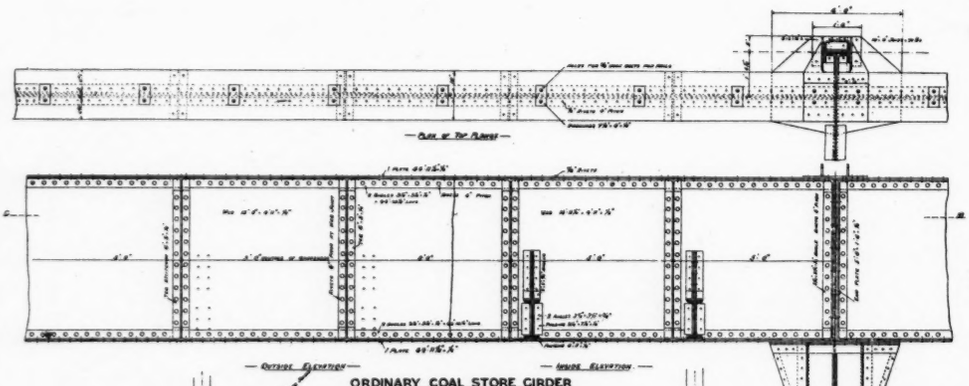
Entering the purifier-house, we do not leave it until sufficient has been seen, and particulars obtained, of it, its contents, and the structures and associated operations, to supply material ample almost for an independent article. The purifiers themselves, the method of raising the covers, the lime-store, the calcining of the lime, the system of charging the boxes—are all points upon which the attention is engaged in turn. But we must deal with the plant and operations in something like a methodical manner in order to make the description of value. As a preface to the detailed treatment it is proposed to bestow on the plant, it may be generally stated that the purifier-house

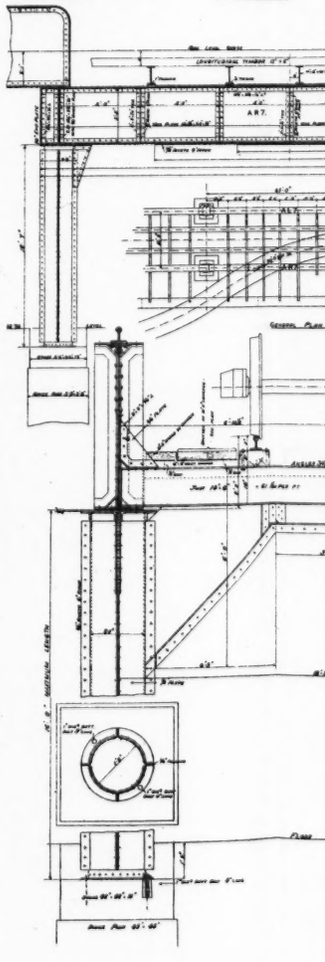


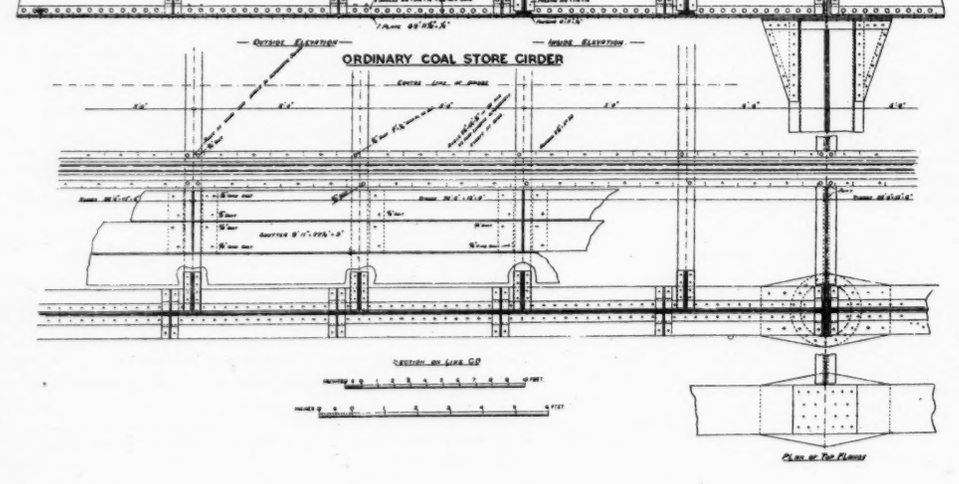



TIPPER GIRDER

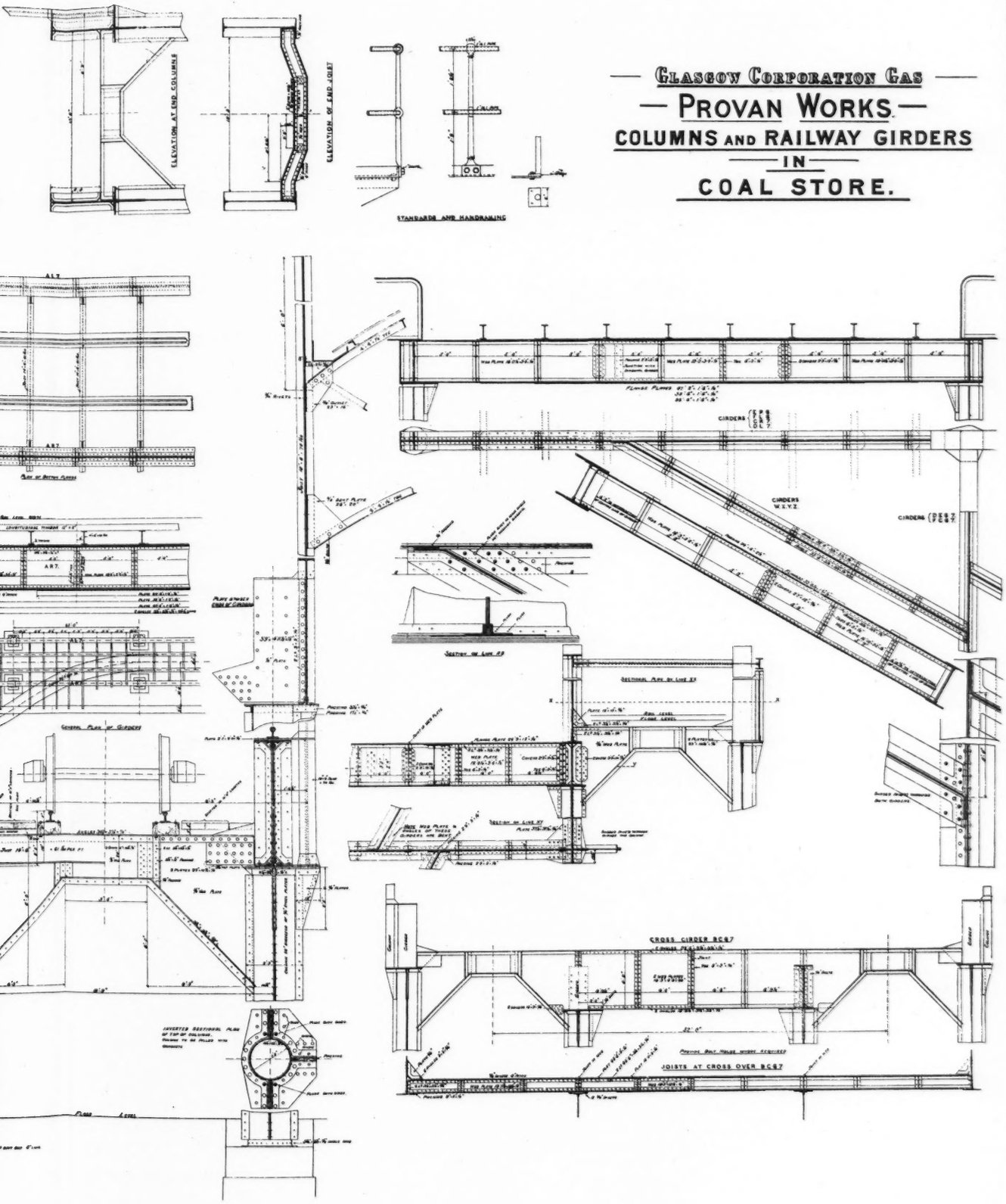


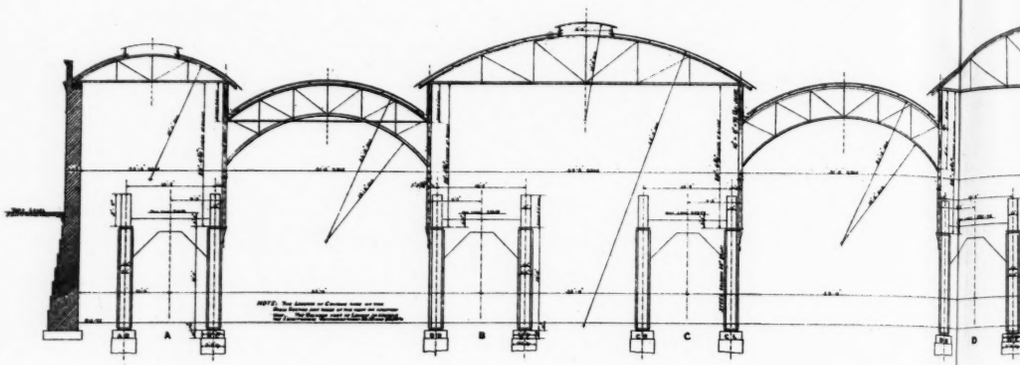




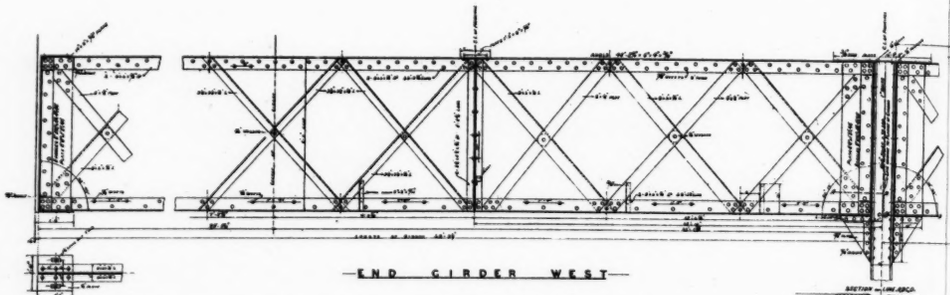

ORDINARY COAL STORE GIRDER

GLASGOW CORPORATION GAS
PROVAN WORKS.
COLUMNS AND RAILWAY GIRDERS IN COAL STORE.

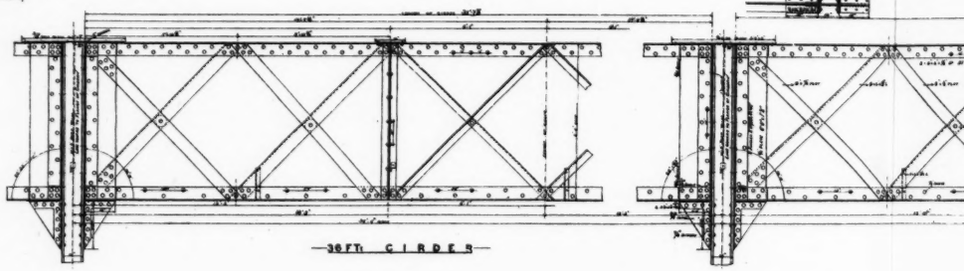




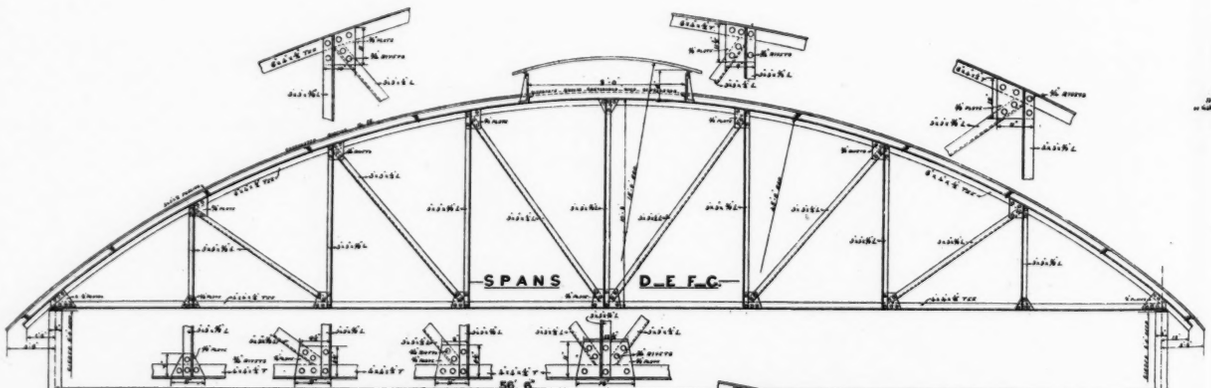
—CROSS SECTION OF COAL STORE—

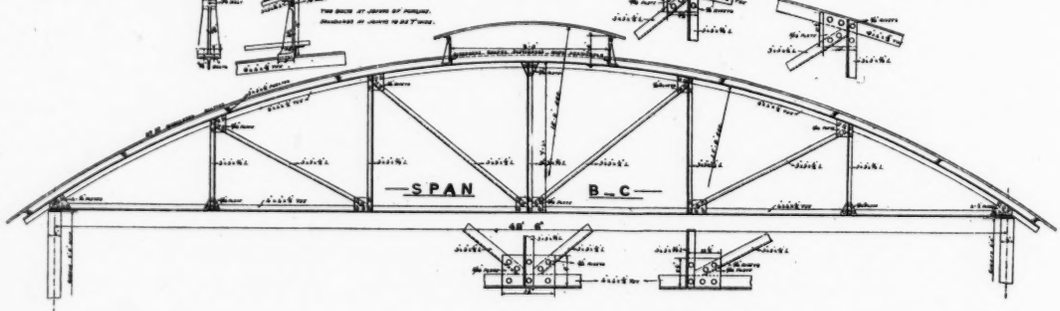


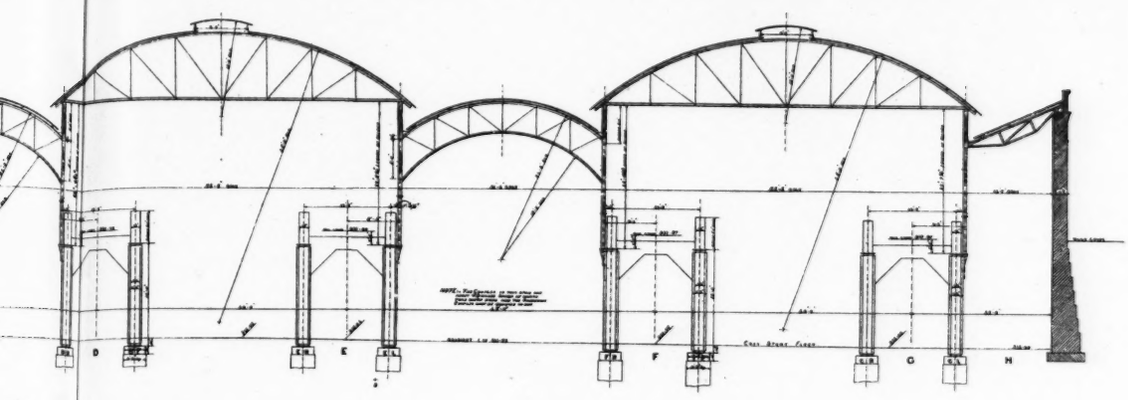
—END GIRDER WEST—



—36 FT. GIRDERS—



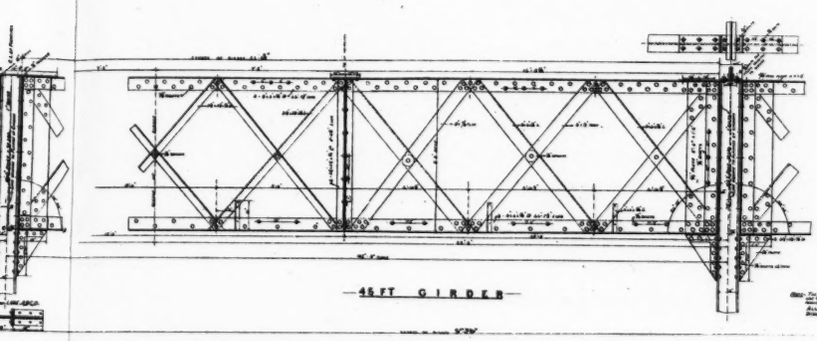




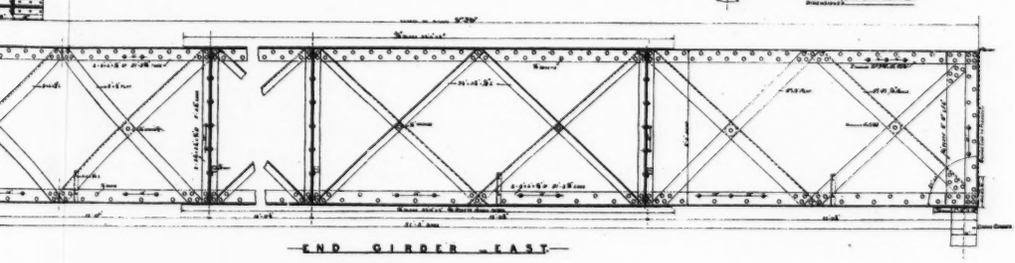
GLASGOW CORPORATION GAS

PROVAN WORKS

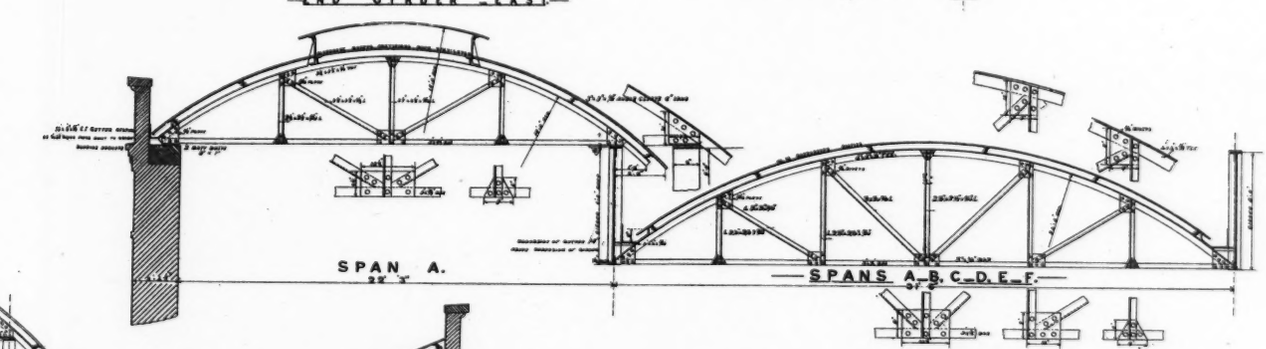
COAL STORE ROOF



45 FT GIRDER

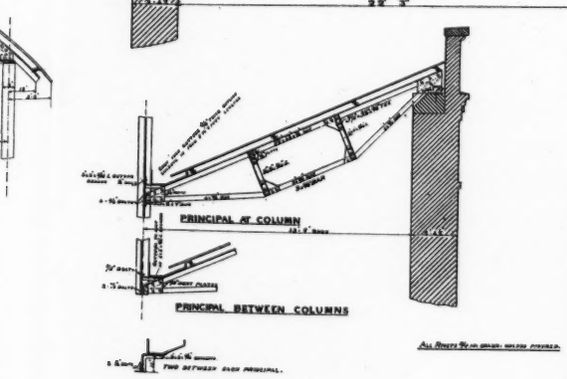


END GIRDER EAST



SPAN A.

SPANS A, B, C, D, E, F.



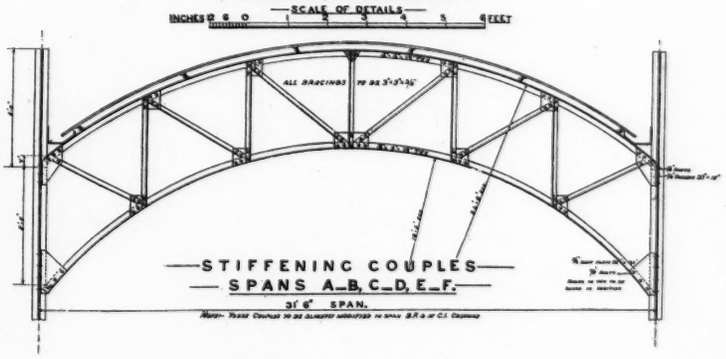
PRINCIPAL AT COLUMN

PRINCIPAL BETWEEN COLUMNS

GUTTER BEARERS.

SCALE

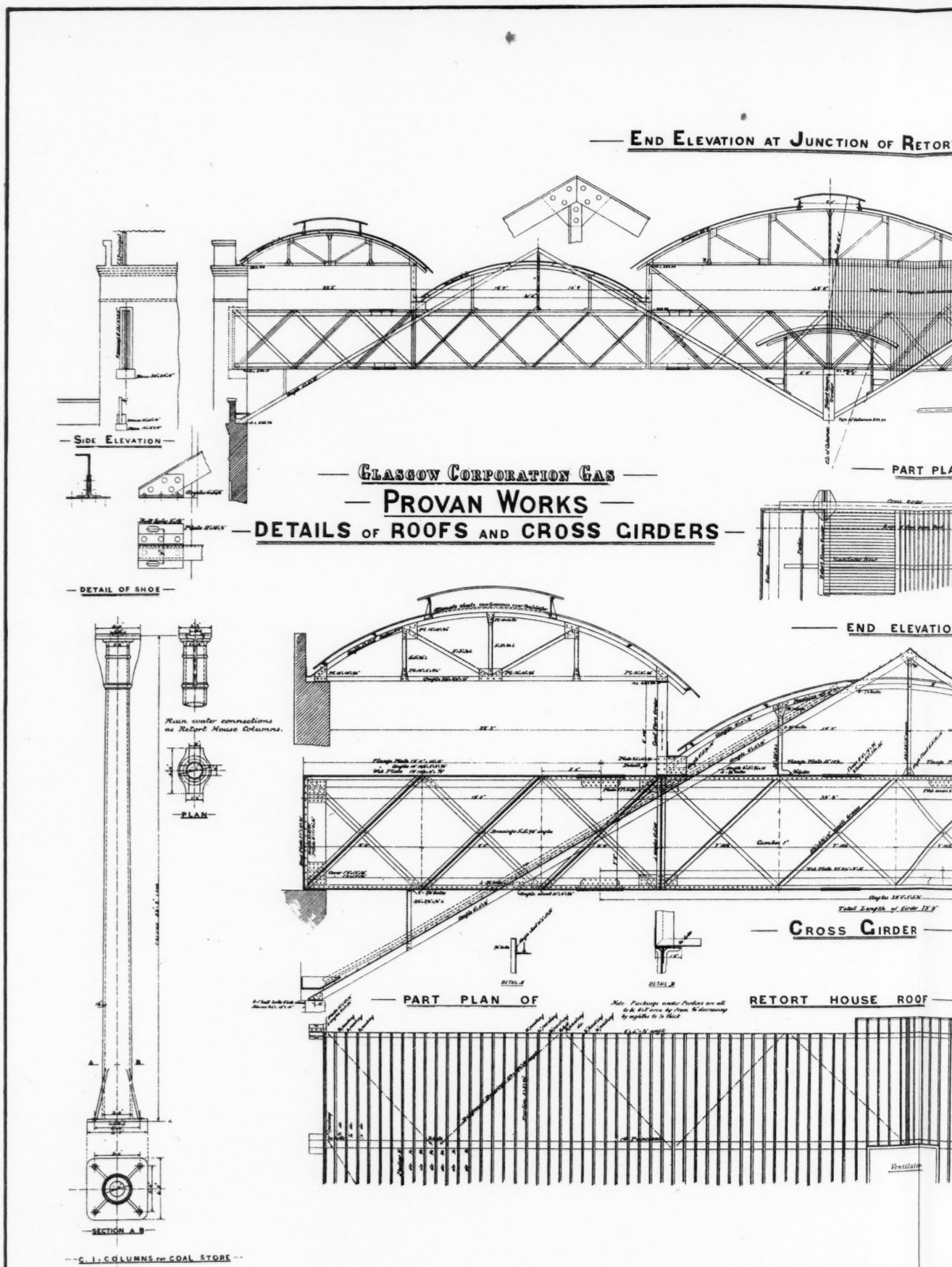
SCALE OF DETAILS



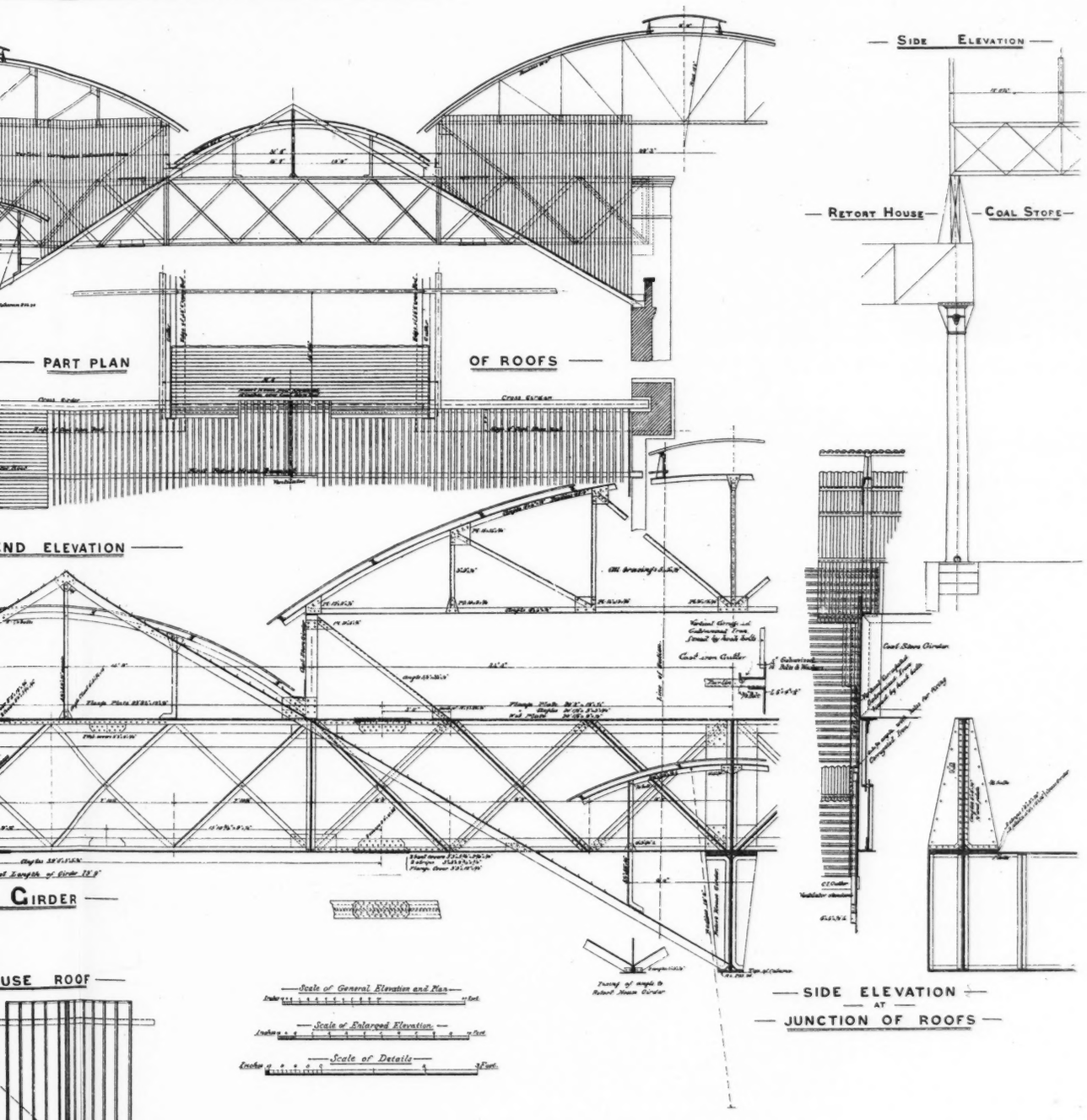
STIFFENING COUPLES

SPANS A, B, C, D, E, F.

31' 6" SPAN.


END ELEVATION AT JUNCTION OF RETOR
SIDE ELEVATION
GLASGOW CORPORATION GAS
PROVAN WORKS
DETAILS OF ROOFS AND CROSS GIRDERS
PART PLA
DETAIL OF SHOE
END ELEVATIO
Main water connections on Retort House Columns.
PLAN
CROSS GIRDER
PART PLAN OF
RETORT HOUSE ROOF
SECTION A B
C. I. COLUMNS for COAL STORE

ON OF RETORT HOUSE AND COAL STORE ROOFS



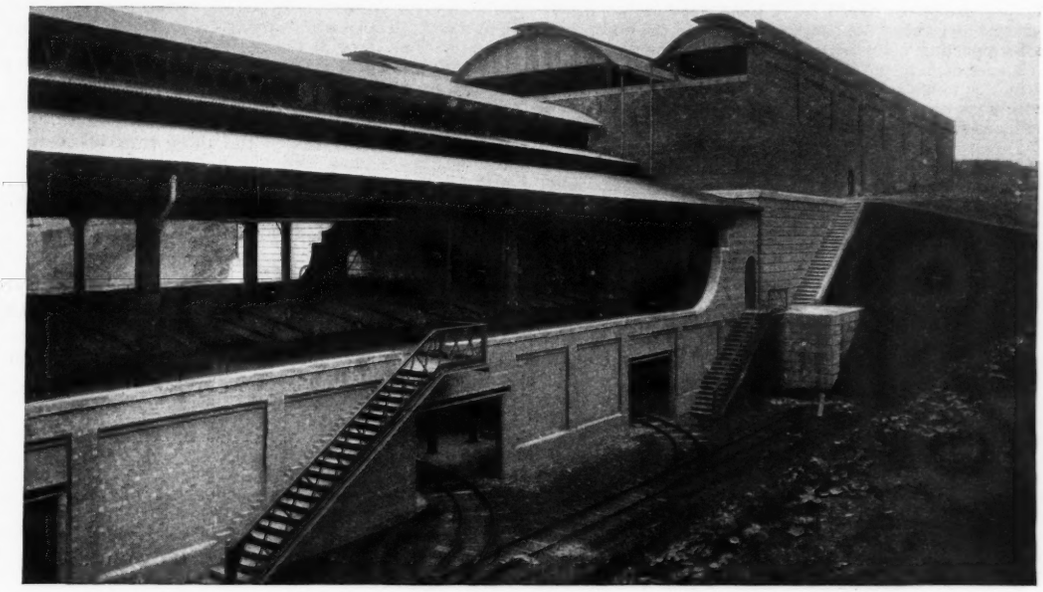


FIG. 23.—ANOTHER VIEW OF THE PURIFIER-HOUSE, SHOWING THE LIME-STORES AT THE HIGHER LEVEL.

FIG. 24.—THE CORRIDOR OVER THE PURIFIERS, FROM WHICH THE PURIFIERS ARE CHARGED.

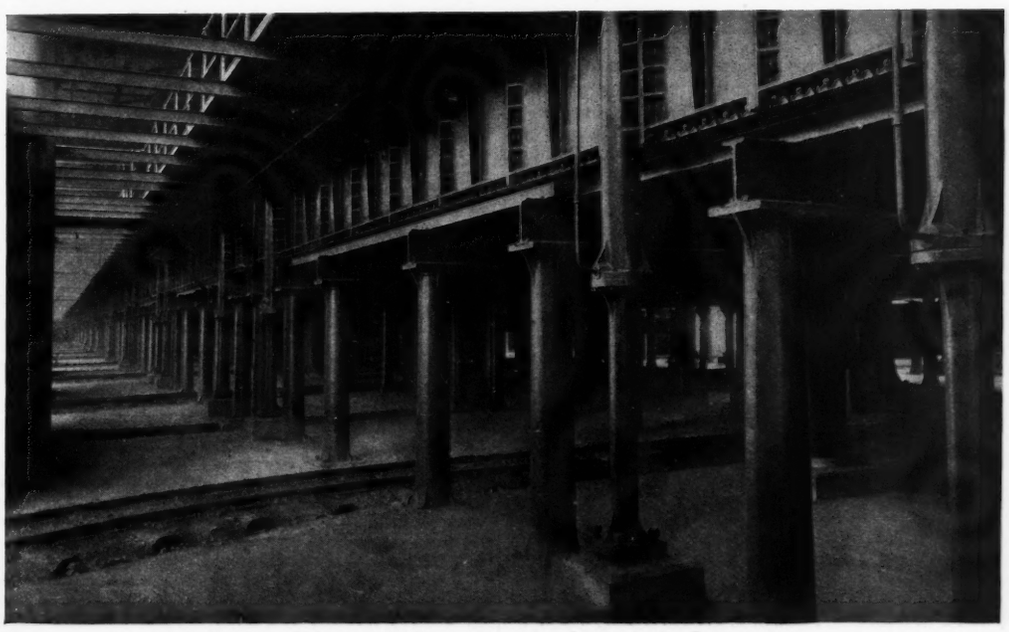


FIG. 25.—VIEW OF THE STRUCTURE BENEATH THE PURIFIERS.

covers a large expanse of ground, being some 503 feet long inside the walls and 85 feet wide from centre to centre of the outer rows of the roof-supporting columns. Within this space are found, elevated, six sets of four purifiers, each 38 ft. long by 27 ft. wide by 5 ft. 5½ in. deep inside measurements, but every two purifiers form a continuous box with a division in the centre. This outline gives some idea—imperfect though it be—of the magnitude of the plant.

Here, at the outset of an inspection, we find more of the heavy work that the irregularity of the surface of the site has occasioned. The back wall of the house has had to be constructed as a retaining wall, of some 125 ft. long, 28 ft. from the floor-level, and varying from 7 ft. 6 in. thick at the base to 2 ft. 4½ in. thick at the top. Four piers, each 2 ft. 4½ in. wide by 3 ft. long, were built with this wall, which throughout its length received a backing of 18 inches of drystone. After the columns (twelve on each side of the house) were erected—which will be more particularly referred to in the next paragraph, and which were provided with concrete foundations 6 ft. square and 15 in. deep capped with stones, 4 ft. square and 15 in. thick—the side walls were built. They are 503 ft. long and 12 ft. high from the floor-level, and 14 in. thick. The gable wall is 89 ft. 1 in. long by 27 ft. high to the top of the cornice, and 2 ft. 4½ in. thick, with panels 2 ft. thick, and plinths to the pilasters 2 ft. 9 in. Above the cornice, the gable is 2 ft. thick. Piers of the same dimensions as in the retaining-wall are carried up with this one. Before passing to the roof ironwork, it may be mentioned that the foundations for the twelve centre columns are of concrete, 10 ft. square and 2 ft. thick. On these are built two brick walls in cement, 6 ft. long, 18 in. thick by 2 ft. 8 in. high, and 3 ft. apart. These walls carry steel joists 5 ft. 8 in. long by 12 in. by 6 in. The floor of the house is of concrete, 12 inches thick, laid with a fall of 4 inches from the centre to the water channels formed in the concrete along each side of the house.

Of course, the roof is of the dimensions already mentioned—viz., 503 feet long and 85 feet wide. The structure supporting it, it is remarked, consists of the three rows of twelve cast-iron columns, spaced longitudinally 40 ft. 9 in. from centre to centre, and transversely 42 ft. 6 in. apart. The columns in the centre row are 25 ft. 3 in. long, measuring 24 in. diameter at the base, and tapering to 21 in. at the top; while those in the outer rows are 26 ft. 9 in. long, with a diameter of 21 in. at the base and 18 in. at the top. The two main girders are built up of six 87 ft. 6 in. lengths, 6 feet deep over all for a length of 55 feet in the centre, and tapering to 2 feet deep at the ends. We need not go into the smaller structural details of these main girders. Between them and the outer rows of columns, there are compound girders 21¼ in. deep by 12 in. broad, formed of rolled steel joist, 20 in. deep by 7½ in. broad, with a 12-inch plate, ⅝-inch thick riveted to the top and bottom flanges.

It is impossible to continue the description of the roof-work without getting a little out of the direct course. The purifiers have not yet been dealt with; and yet, perforce, we must here state how they are filled—and this, as a matter of fact, is a feature of the house. Above the purifiers for the full length of the building, and constructed with the roof, is an overhead corridor (seen in fig. 24), along which on rails the lime is brought from the

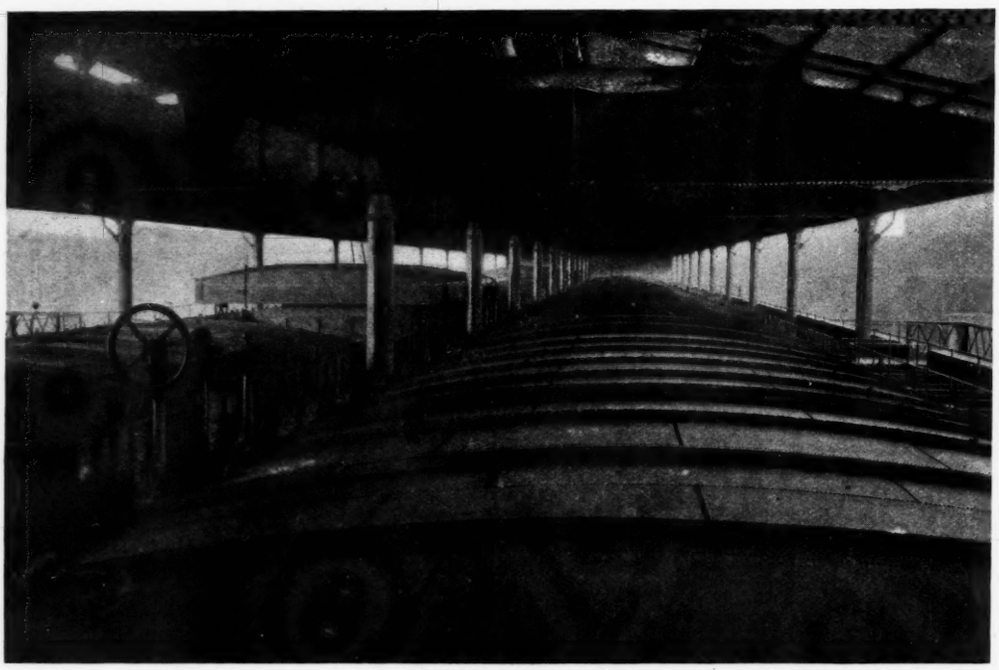


Fig. 26.—View of the Ranges of Purifiers—Showing one of the Covers Raised on the Carriages.

lime-store in bogies, by means of a hauling-engine and wire rope; and through filling-tubes in the side divisions of the floor of the corridor the material is discharged into the purifiers below. This passage is constructed of two rows of lattice girders resting on the main girders and end walls; and when it is mentioned that these lattice girders are 11 ft. 6 in. deep over all, and placed 25 feet apart, some idea will be afforded of the dimensions of the passage. Its floor is constructed of rolled steel joists resting on the bottom flange of the lattice girders, beneath which are also cross girders. The floor is made of concrete 3 inches thick, reinforced by expanded metal; the concrete being composed of three parts of broken brick or coke breeze, one part of clean sand, and one part of portland cement, with a ¾-inch surface of granolithic. The sides of the passage for a height of 6 feet have been similarly constructed; and the outside of these side walls (as well as the underside of the floor) has been neatly plastered with portland cement. Through this passage run two lines of railway, of 2 ft. 6 in. gauge, for the lime-conveying bogies.

Now we can return to the roof-work of the house. Over the passage just described, and bolted to the top flanges of the lattice girders, are 38 principals placed 13 ft. 7 in. apart, and formed of 4 in. by 3 in. by ⅜ in. T-bars, curved. A similar number of principals, of slightly heavier section, extends from either side of the central passage to the compound girders on the outer rows of columns. The purlins are all of 3 in. by 3 in. by ¼ in. angles. For the full length of the roofs, there is a ventilator 9 feet wide and 2 ft. 6 in. high; and both the roofs and ventilator are covered with galvanized corrugated sheet-iron (of No. 16 B.W.G.), bent to the curve of the principals. Several stairways lead from the ground level to the upper floor of the house; and at each side at the gable walls a stair extends from the ground level to the overhead passage.

Turning now to the purifiers, it will be remembered that there are 24, in six sets of four, of 38 ft. long by 27 ft. wide by 5 ft. 5½ in. deep. The foundations consist of nine walls of brickwork in cement with a centre wall between each two purifiers; the centre and outside walls being 14 inches thick and the others 9 inches. On these, is carried the structure supporting the purifiers; it being composed for each double purifier of 33 cast-iron columns, eleven main I beams, and twenty secondary I beams. The columns are 7 feet high, by 12 in. diameter at the base, tapering to 10 in. at the top. The main beams are of rolled steel joists, 12 in. deep by 9 in. broad; and the secondary beams, rolled steel joists, 6 in. deep by 5 in. broad—the former being bolted to the tops of the columns, and the latter extending the full length of a double purifier, and placed exactly underneath the joints of the bottom plates.

It has been stated that every two purifiers form a continuous box, with a centre division. The plates used in their construction are ¾ inch thick. The bottom ones are 4 ft. 2⅝ in. by 4 ft. 6 in., strengthened with webs 2¾ in. deep, cast crossways between the flanges; the side ones are 4 ft. 2⅛ in. wide, and 6 ft. 1 in. high; and the end ones, 4 ft. 6 in. wide, and the same height as the side plates. Both side and end plates are strengthened by an intermediate flange ⅞ inch thick. The flanges for the support of the grids are 2 in. wide by ⅞ in. thick, stiffened with brackets, about 14 in. apart. Mr. Foulis preferred to adhere to the luted type of purifier; and it is seen that the lutes on the side and end

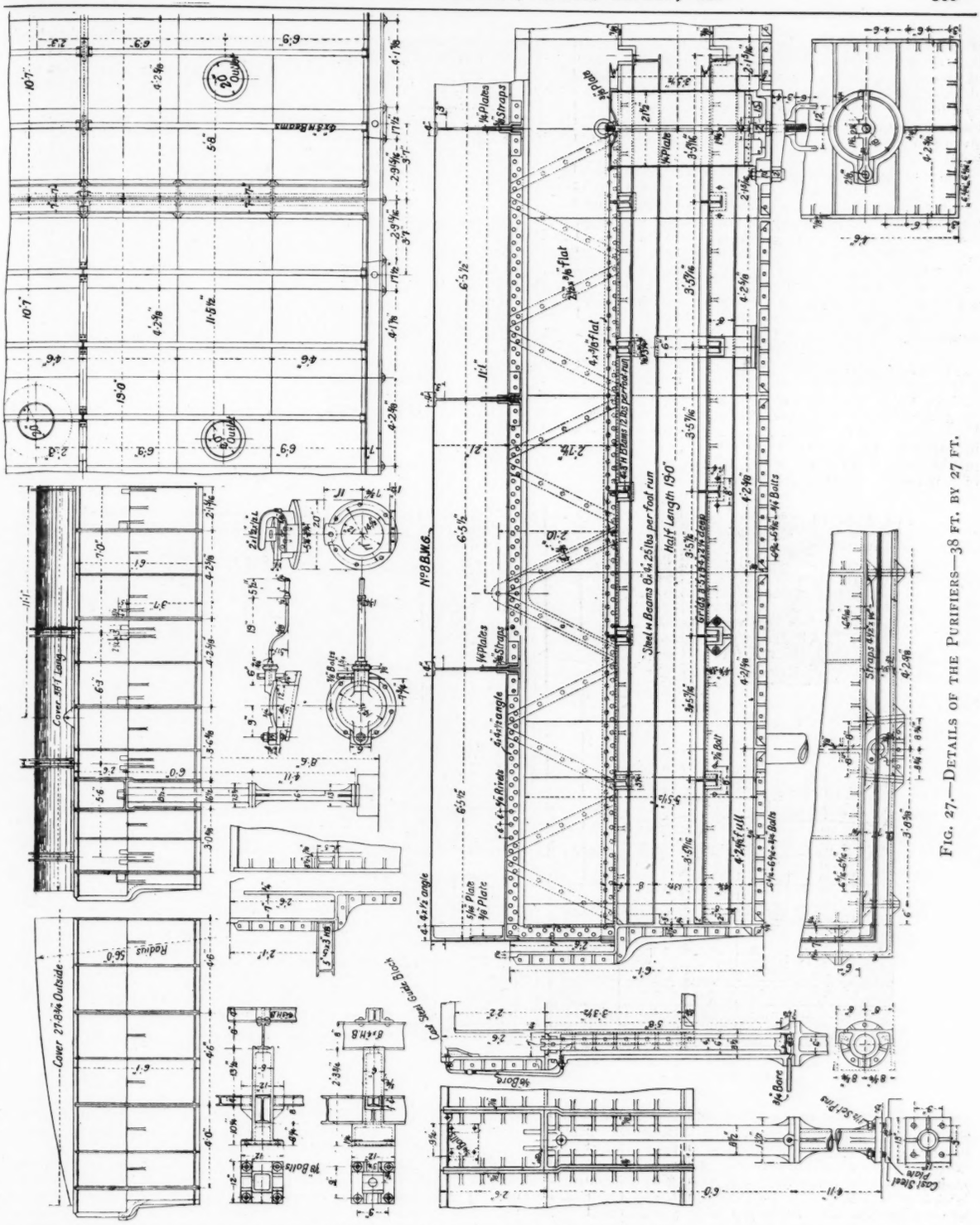


FIG. 27.—DETAILS OF THE PURIFIERS—38 FT. BY 27 FT.

plates are 2 ft. 6 in. deep by 7 in. wide. The division-plate has a lute on either side; the only difference in the dimensions being that these are $\frac{3}{4}$ in. less in depth. The covers measure 38 ft. 1 in. long by 27 ft. $8\frac{3}{4}$ in. wide over the plates. At the sides, they are 2 ft. $7\frac{1}{8}$ in. deep; and at the ends 4 ft. $4\frac{1}{2}$ in. deep at the centre and 2 ft. $7\frac{1}{2}$ in. at the sides. The sides and ends are each in one plate, $\frac{5}{16}$ inch thick. An angle 4 in. by 4 in. by $\frac{1}{2}$ in., with sides splayed to the rise of the cover, is riveted along the top edge of the side plates, and continued round the ends. The sides and ends are strengthened with bottom and diagonal bars; and an angle-bar, curved to the proper radius, is attached to the main angle. The top of the cover, which is arched to a radius of 56 feet, is constructed of steel sheets (No. 8 B.W.G.), about 9 ft. $4\frac{3}{4}$ in. long, by 5 ft. $6\frac{1}{2}$ broad. The framework of the cover is of lattice girders, 25 inches deep at the centre, and attached to angle-bars by straps and bolts. Each cover is also provided with seven holding-down straps made up of two bars of flat iron, $3\frac{1}{2}$ in. by $\frac{3}{4}$ in. thick, kept 3 inches apart by cast-iron thimbles. These straps are placed across the covers over the girders, and are secured to them by $\frac{7}{8}$-inch hook bolts. The ends project over the purifiers $6\frac{1}{2}$ inches, and to these the holding-down bolts ($1\frac{3}{4}$ in. diameter in body, and $2\frac{1}{4}$ in. over the screws) are attached. As to the bearing-bars, each purifier is provided with two main I beams 8 in. deep by 4 in. broad, and 40 secondary beams 4 in. deep by 3 in. broad. The escape-valve on each cover is 12 inches diameter; and in the bottom of each box are two 18-inch discharge-plugs. Each set of purifiers is controlled by a hydraulic centre-valve; and both the inlet and outlet pipes are 20 inches diameter.

It should be stated, before proceeding farther, that between the purifiers a floor has been formed by angle-bar bearers, covered with 3-inch planks, and along each side of the house between the purifiers and the fence wall is a gangway 4 ft. 6 in. wide, supported on rolled steel joists, and covered in the same manner as the intermediate floors.

HYDRAULIC CYLINDERS FOR COVER LIFTING.

The system of lifting the covers is worthy of special mention. This is done by four hydraulic cylinders fitted to each purifier. The cylinders are 6 in. inside diameter by 6 ft. long, and are fitted with a steel piston and rod, which is 4 in. diameter and 5 ft. 9 in. long, and works in a stuffing-box in the upper end of the cylinder.

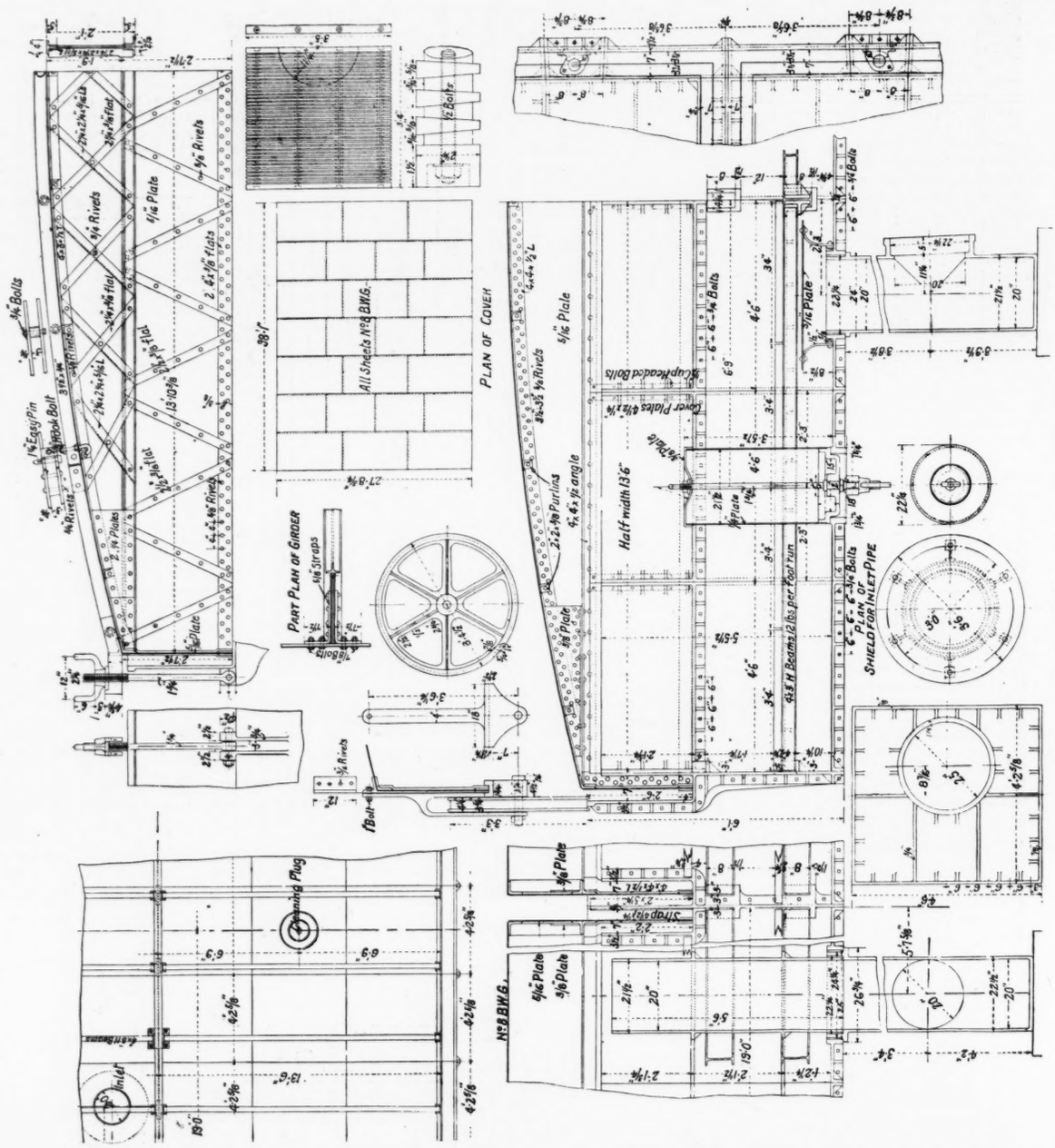


FIG. 28.—FURTHER DETAILS OF THE PURIFIERS.

On top of the piston-rod, a recess is formed to receive the bottom edge of the purifier-cover. Situated between the purifiers, and to the number of 24, are the force pumps for working the hydraulic cylinders; the connection being by strong malleable tubing of 1¼ inches inside diameter. The tubing and connections have been proved to a pressure of 400 lbs. to the square inch. A cover was lifted during our visit to the works; and it was seen that this is an easy and expeditious way of uniformly raising these heavy covers. When raised, carriages with cast-steel wheels are put underneath the cover, and bolted at the top to a snug fixed on the latter. The track for the wheels is the outer edge of the cup; and along this, by these means, the cover is quickly run over the top of the next purifier.

LIME KILNS, STORES, &c.

It will have been already gathered that at Provan the purification is carried on by lime; no oxide being used. By the way, it has not been mentioned that, in the purifiers, the system is to have only two 10-inch layers of lime, supported on wooden grids. The Engineer prefers to have the lime calcined on the works; and, for this purpose, four lime-kilns have been erected, the casings of which are 16 ft. diameter by 19 ft. 7 in. long, and formed of ⅝-inch steel plates. The limestone is brought in waggons, to the charging-platform above and surrounding the group of kilns. This platform is supported on a structure composed of columns, joists, and girders, and in all is 85 ft. long by 74 ft. wide, with an approach 19 ft. long, and of an average width of 21 ft. The floor of the platform is filled in with 4½-inch thick concrete, reinforced by expanded metal; and on it are fixed the sleepers and the rails connected up to the general railway system of the works. Space has been allowed to bring the total number of kilns up to twelve, as the works' scheme is further developed.

The lime shell from the kilns is filled into waggons and carried into the lime-store on high-level platforms, from which it is discharged on to the floor of the store, and there slaked. From here it is loaded into waggons, and conveyed along the corridor in the roof of the purifier-house (as previously described) for feeding, through shoots, the purifiers below. This disposes of the system of working; but we may stop to briefly indicate the structural features of the lime-store. It is built at the west end of the purifier-house, and at a higher level, so that once more we have an illustration of how the differences of level have been made to serve and facilitate the transport of material. Numerous retaining-walls, it is observed, have had to be built on the works; and here again we find that the back wall of this store is one, of 124 ft. 8 in. long by 10 ft. high, and varying from 3 ft. 10 in. thick at the bottom to 2 ft. 4½ in. at the top, with concrete coping. It contains six substantial piers, and has an 18-inch drystone backing. The side wall is 152 ft. long by 2 ft. thick; and this also rests on another retaining-wall, and is bonded into the one mentioned above and into that described in connection with the purifier-house. The front wall is of the same length as the retaining-wall (124 ft. 8 in.), is 18 ft. 6 in. high, and 2 ft. thick; and this rests upon the retaining-wall of the purifier-house. Altogether the store is 150 ft. long by 122 ft. wide, in three spans. The roofs are supported on a structure of columns, rolled steel I-joists, steel T-bar principals, and angle-bar purlins; the covering being of galvanized sheet-iron (No. 16 B.W.G.) bent to the curve of the

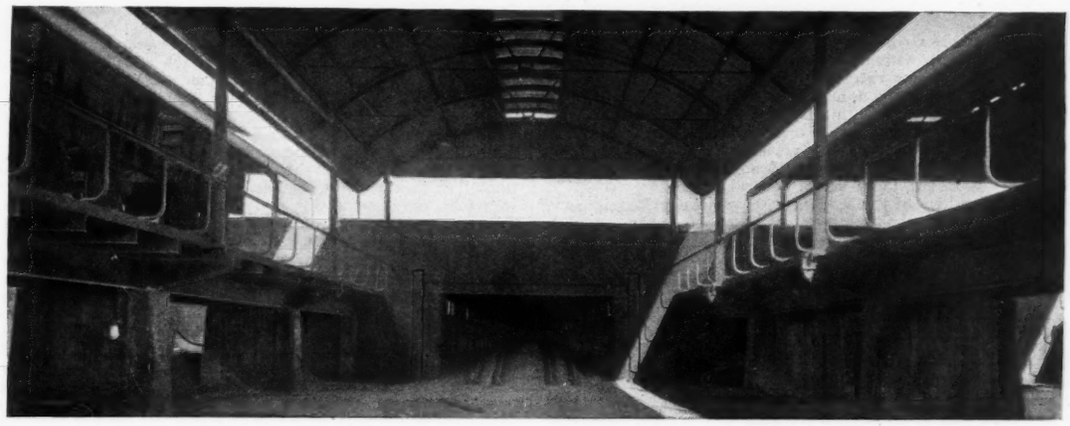


FIG. 29.—VIEW INSIDE THE LIME-STORES, SHOWING ALSO THE CORRIDOR THROUGH THE ROOF OF THE PURIFIER-HOUSE.

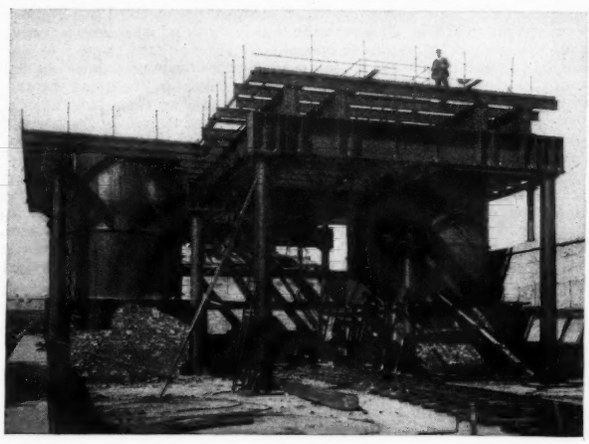


FIG. 30.—LIME-KILNS IN COURSE OF CONSTRUCTION.

principals. Between the roof spans run (above the floor) three lines of railway, each 154 ft. long. The floor, by the way, is composed of waste lime and ashes, mixed together and pounded into a layer 6 inches deep.

METER-HOUSE.

We will conclude this second article with the meter-house, which is close to, and harmonizes architecturally with, the exhauster-house. It is 72 ft. long by 70 ft. 6 in. wide by 22 feet high from the floor to the seats of the roof principals—all inside measurements. The walls are 18 inches thick, resting on concrete foundations, and all, except the front one, are panelled. Ample window provision is made in the east and west walls; and altogether it is a good looking building. The roof is in three spans, supported on two plate girders. Three station-meters find accommodation in the house—two of them having been supplied by Messrs. R. Laidlaw and Son, and one by Messrs. James Milne and Son. Each meter is capable of passing 200,000 cubic feet of gas per hour, at 80 revolutions.

By inadvertence, the illustration for the producers for the oil-gas plant was inserted in the article last week in conjunction with the outside producers for the coal-gas retort-settings. The little resemblance between the two—one being circular with a solid hearth, the other rectangular and water-sealed—and the differences in dimensions, will have already corrected the mistake.

FIG. 31.—EXHAUSTER AND METER HOUSE.

THE PROCEEDINGS AT THE INAUGURATION OF THE WORKS LAST WEDNESDAY.

The formal opening of the works took place on Wednesday last. Invitations to attend the ceremony had been issued to a large number of gentlemen representative of the gas industry or members of corporations; and the magnitude of the event insured a ready acceptance of these. When the party assembled on the platform of the Queen Street Station of the North British Railway Company, it was manifest that there was a very widespread interest in the latest and greatest work of the Glasgow Corporation. A special train conveyed the party to Provan. At the entrance to the works, the railway engine was detached, and a works locomotive, gaily decorated, hauled the carriages to a specially constructed platform at the north end of the coal-store. A short walk brought the visitors to the lower end of the store; and on entering, upon the ground level, they found that Lord Provost Sir John Ure Primrose, Mr. R. M. Mitchell (Convener of the Gas Committee), and Mr. Alex. Wilson (the Gas Engineer) had already taken a position upon the elevated railway platforms. From this vantage ground,

The LORD PROVOST, addressing the assemblage, said: We are about to discharge two waggons of coal as it has come straight from the collieries into these works, for conversion into gas and its residual

products. I have to express the hope that great success will attend this civic undertaking.

Two waggons of Lanemark coal were in position; and the hydraulic plant having been set in motion (in the one case by the Lord Provost, and in the other a second or two later by Mr. Mitchell), the waggons soon came into sloping position, and their contents thundered down the shoots into the hoppers. With this simple ceremony, and without further remark, the great works were opened for continuous service. The party then spent about two hours viewing the works, a proceeding which was greatly facilitated by magnificent weather. By the time this private view was over, there was a general consensus of opinion regarding the splendour of the works, both in area and equipment. The party had entered at the high level; and they left at the low level, entraining at another specially erected platform. They were conveyed back to the city by the same route as that which they had traversed on the outward journey; and, repairing to the City Chambers, they were entertained to a sumptuous luncheon in the Corporation Banqueting Hall.

The Lord Provost presided. At his right hand sat Mr. W. Foulis, son of the late Gas Engineer to the Corporation. The toast-list embraced eleven items; but, of course, in a number of them our readers have no special interest.

Mr. Nathaniel Dunlop, proposing "The Corporation of Glasgow," said he had been astonished beyond measure at the great enterprise which they had seen inaugurated. He recalled how, not long ago, electricity threatened to extinguish gas; but gas was not so easily put out. Instead of diminishing the demand for gas, electricity had simply stimulated it; and they had that day seen one of the most extraordinary illustrations of the demand which now existed in the great work they had visited. This work was a monument to the ability of the man who founded it; and it was a monument to the ability and capacity of the men who were at the head of its management.

The Lord Provost replied, and proceeded to propose the toast of "The Gas Committee." He said they had that day been away on the further circumference of the city; and they had seen a confederation embodied there for the good of the public, who were an aggregation of the greaest number of shareholders who ever entered into any enterprise. They had the further note struck that in the civic life every individual, down to the humblest ratepayer, had his interest at stake, according to his circumstances, and realized that it should be the aim of those who governed that, without regard to material position, they should look with a clear and sincere eye to the public good, and should conduct the public service on lines of economic judgment, with methodical care. Whether the enterprise were the supply of pure water, the giving of a perfect system of intercommunication between every part of the city, or the provision of that which made their somewhat sombre winter evenings luminous and bright—a pure and cheap light—it should be carried on with a sincere desire in their hearts to give advantage to every citizen, of every degree, and, under co-operative municipal enterprise, at the minimum of cost, and with the maximum of efficiency. He felt certain those who had viewed that day the vast and complete work would say that the Corporation could, from their point of vantage, do things on a magnificent scale; for he believed that the new gas-works at Provan would rank among the greatest in the world. One feeling of regret must be present in the heart of every colleague of his—that Mr. Foulis, whose brain and whose soul were in the enterprise, and who, with profound knowledge, and intense and never-failing sincerity of purpose, devoted his intellect, his soul, and his physical strength, to the service of this great Corporation, was not with them to see the fulfilment of his hopes and labours. It was a happy circumstance, and, he thought, in every respect a most graceful act, that they had placed beside him on this occasion the son of Mr. Foulis, who would be able to tell his mother that the memory of her husband was still cherished, and that, while men might pass away, after doing their little part in the State or the nation, the memory of devoted service would never be forgotten. While the material realization of the work performed by such a devoted servant might have to receive its fulfilment in other hands than those of him who inspired and directed it, the servant who to-day occupied his position, and who was trained under his master-hand, gave them every confidence to hope that traditions as honourable, potent, and far-reaching to the community, would be their permanent possession. He would couple with the toast the name of Mr. Mitchell, who had, with efficiency and acceptability, shown whole-heartedness in guiding them aright in gas matters.

Mr. Mitchell said he felt a little overcome, partly by the eloquent terms in which the toast had been proposed. Than the Lord Provost, he believed that no more feeling heart was ever at the head of a corporation, and no more sympathetic man, apart from his being a Lord Provost. He thanked him for the allusions he had made to himself; and he thought they would endorse every word he had uttered with respect to the late Engineer, Mr. Foulis. He could only say, for himself, that his work for twenty years on the Gas Committee had been to him a great pleasure. He had had able and kindly colleagues ever since he had been on the Committee, and he took the opportunity of thanking them for their co-operation in everything he had done towards maintaining the distinguished position the Committee held, and which he hoped they would always hold, in corporation management, and also in the desire to benefit in every respect the citizens of Glasgow. It was now almost a generation since the Corporation bought the works and business of the Companies who previously supplied the gas. It was a wise and a prudent thing to do. It was just a specimen of what he knew to be the desire of the Corporation towards all the citizens; and it was also another instance of what, in many other departments, had proved to be a conspicuous success. Since the Corporation took over the gas supply, and formed out of it a Municipal Department, he thought he might boldly say that the record had been one of unbroken prosperity. Of course, they had had little times when things were not favourable to them; but, year by year, until now, the price of gas had been steadily reduced, and at that moment the citizens had the privilege—and it was a privilege, he believed—of purchasing gas at a great deal less than half the price they paid previous to the arrangement between the Corporation and the Companies, when the charge was 4s. 7d. per 1000 cubic feet. For 2s. 1d. per 1000 feet, the citizens could have an excellent 20-candle gas—an illuminating power which was almost unknown beyond the borders of Scotland. Besides this, the citizens could have from the Corporation, at very moderate prices, heating and cooking appliances, gas-stoves, and gas-fires, which added a great deal to the comfort and the happiness of their homes—especially of those smaller homes of the working classes of which they had so many in their midst. Of course, the prosperity of Glasgow had grown by leaps and bounds. Probably some of them would be surprised to know that the revenue of the Gas Department had now reached the princely sum of £820,000; and this, considering that the price of gas was less than half what it was when they took over the business, was an increase of nearly fourfold. In winter, the demand was something enormous; and they would be astonished to know that on a foggy day in winter they sent out £3600 worth of gas. He hoped next winter, whether it were foggy or not, this quantity would be exceeded; and from what they had seen that day, they would know that the Committee would be quite able to cope with any demand they might have. They must not suppose their works had been conducted on other than business-like principles. They had been carried on in the most up-to-date manner, in regard to treating the up-keep and the depreciation, and all those things which tended to make every enterprise, whether municipal or private, successful in the long run. He was sorry they had only seen their newest and best works, because, had they inspected the older ones as well, they would have been able to appreciate the fact that in the gas-works the citizens of Glasgow had a magnificent and splendid asset. He need not say very much about the Provan works. They had seen them, and they had got Mr. Wilson's beautiful souvenir, which must have interested them; and they knew that the works were as good as they could be made. He must say the Provan works were the masterpiece of their late Engineer, Mr. Foulis, of whom the Lord Provost had spoken so kindly—but yet none too kindly—and who was respected, and ever would be, by the Corporation. He designed them. It was a real joy to him to watch them growing under his hand; and if he was not with them that day (for unfortunately he did not live to see the time when they should be finished), he was sure none of them would forget the splendid work he did for the Corporation, and not one of them would grudge him the rest he now enjoyed. He hoped that, whether or not electricity went on and got to be a greater factor in the life of the city, the gas undertaking would continue to prosper under the management of Mr. Wilson—Mr. Foulis's successor. He could only say that since electricity had come among them, they had, as a Gas Committee, prospered more and more. He trusted that, in the years which were before the Gas Committee, they would continue to go on and increase. A new mantle had fallen upon them—and they were told always that when a mantle fell upon one it meant a wonderful accession of prosperity. The mantle of incandescent lighting was upon them; and he believed it was to be the great future of the prosperity of all gas industries. Might it be the prosperity of the Glasgow Gas Committee, might they go on, be worthy of themselves and of their great Corporation, and be a vigorous, trusted, and progressive member of that Corporation of which they were all so proud.

Mr. Calderwood proposed "The Contractors." He said that it was four years last June since the ground was opened by Sir Samuel Chisholm cutting the first sod. He thought they ought to congratulate the Contractors upon the early and satisfactory completion of the works. In their hands, a great change had been made on the landscape. The hills had been removed, and the rough places made plain; and there were now standing in the area, large and important works which had given employment to great numbers of workpeople, for the benefit of the citizens of Glasgow. The Gas Committee went on safe lines, in the way in which they settled their contracts. While in every instance they accepted the best offer, it had been found that invariably this was the lowest. The Gas Committee had had the greatest pleasure in their business with the Contractors. While they had been dealing with hundreds of thousands of pounds, they had had practically no disputes with the Contractors in connection with the new works. The Contractors appeared to have had the greatest pleasure and satisfaction in carrying on their work under the Committee. Among the Contractors who had had the largest part of the work, he would name Messrs. R. M'Alpine and Sons, the Barrowfield Iron-Works, Limited, and Messrs. R. Laidlaw and Sons. One incident he might mention was the great saving effected by the fact that all the bricks used in the erection of the buildings were made on the ground from clay taken out of the excavations.

The toast was acknowledged by Mr. R. M'Alpine, Mr. R. Laidlaw, and Mr. A. S. Biggart.

Mr. M'Alpine said the utmost cordiality had existed between the Gas Committee and the Contractors. They had got on very well together all through the work, and also with the Engineers—Mr. Foulis, to whom the Lord Provost had referred so touchingly, and his able successor Mr. Wilson—as well as with the officials in the Gas Engineer's office. The Contractors desired that the Lord Provost should have some little memento of the opening of these important works during his term of office; and he had much pleasure in asking his Lordship to accept of a small souvenir from them.

The gift took the form of a set of six silver fruit dishes.

The Lord Provost thanked the Contractors for the beautiful memento they had given him. It was beyond his desires; and he should value it highly and cherish it.

Mr. Laidlaw said he hoped all of them had carried out their contracts to the best of their ability. The works were all designed by the late Mr. Foulis, even to the smallest detail; and he thought that gas engineers from other towns would appreciate what they had seen. He had the honour of Mr. Foulis's acquaintance for about forty years; and he had pleasure in saying that he was one of the straightest men he ever met. He never spared himself. He devoted his whole time and energy to his work; and he was confident he was one of the best officials of the Corporation. William Foulis required no monument to his memory; the works they had seen that day were his most enduring monument. He had now a most happy duty to perform. Mr. Mitchell had been a town councillor for a very long time, and had been Convener of the Gas Committee for some twenty years. He thus held the position of Chairman of a large and flourishing manufactory, because

gas making was really a commercial business. He often thought the public had very little idea of how much really hard work men in the Town Council performed. The Gas Department of Glasgow was a huge undertaking. When they considered that they consumed 700,000 tons of coal every year, they could easily understand what a large amount of business had to be done. The Convener must know exactly what was going on. Mr. Mitchell was not actually engaged in business; and so he was the right man in the right place. He had, therefore, the greatest pleasure in asking him to accept a small gift from the Contractors.

The gift was in the form of three silver salvers.

Mr. MITCHELL said he felt great thankfulness to the Contractors for their kind gift. He anticipated that it was intended as a compliment to the Gas Committee; and as such he accepted it. He would read the inscription to them. It was: "Presented to R. M. Mitchell, Esq., Convener of the Gas Committee, by the Contractors, on the occasion of the formal opening of the Provan Gas-Works of the Glasgow Corporation, Sept. 14, 1904." He should keep the gift as a happy memento of his twenty years' connection with the Gas Committee.

Mr. BIGGART presented Mr. Calderwood with two silver bowls, and Mr. Willock, the Convener of the Sub-Committee on Finance, with silver candelabra.

The recipients returned thanks.

Sir SAMUEL CHISHOLM proposed "The Gas Industry." They would observe, he said, that his toast was not "The Gas Enterprise of the Glasgow Corporation," great and vast though they had that day seen it to be. It was the gas industry, wherever it existed, and whether carried on by municipal corporations or by private companies. The application of the terms of the toast, he supposed, was to be found in the desire of the Glasgow Corporation to manifest the width of their sympathies—that they went out to all the workers in the great task of diffusing light, wherever they were found. The part which the gas industry had played in the history of their social and industrial growth and development was one which it was almost impossible for them to realize to-day. In order to do so, they would require to go back to a period—not so far back after all—when their private residences, their public places of resort, their houses of business, and the streets, not only of little villages but of great cities, were lit up with nothing better than wretched oil-lamps. In town councils, they frequently had a watching and lighting committee. People sometimes wondered at the combination. The explanation of it was that, in the old days, the watchman did the lighting. But the changes which Murdoch's discovery of gas for artificial lighting introduced, amounted to no less than a social revolution. Their personal, their domestic comfort, their public safety by the diminution of crime in their great cities—all these things had been greatly accelerated by the discovery, and by its consequences; and if they were to look from another point of view, they would have a further illustration of the great importance of the gas industry. Mr. Wilson had supplied him with some figures, from which he saw that the amount of capital employed by 35 companies and corporations in the United Kingdom was, as nearly as might be, £46,000,000; the coal carbonized was nearly 7,500,000 tons; and the revenue almost £14,500,000. The question was, Would the gas industry continue to flourish, or would it go down? He remembered the controversy which took place many years ago, as to whether or not there would be such a depreciation of horses as would occasion their disappearance altogether, when the railway system began to spread over the country; and it was ludicrous to-day to look back upon those novel prophecies and presumptions. But they helped them to understand how the generation of to-day would anticipate the requirements of the generations to follow. The fact was that the cost of gas was gradually diminishing, and that the methods of extracting the light were gradually improving. These things were the best answer to persons who feared that the gas industry would expire. It was prospering, because it had succeeded in drawing to itself men of action, men of study, and of genius, who had devoted themselves wholly to the work; and they, in Glasgow, when they looked back upon the great man whose name had been already mentioned with reverence, were aware of this. He had the pleasure of coupling the toast with the names of two such great men.

Mr. D. IRVING, the President of the Institution of Gas Engineers, thanked them, on behalf of the Institution, for having invited him there as their representative. He could not but give expression to the feeling of deep regret that the mind which conceived, and the hand which designed, the magnificent works they had inspected that morning was no longer with them; but he congratulated them that they had been able to find a successor to him, in the person of Mr. Wilson, from their own staff. He trusted that they would extend to him, as he was sure they would, that confidence and that sympathetic support without which no officials, however able, could possibly succeed. The management of the Glasgow gas undertaking had been most excellent, from the expert's point of view. At that late hour he had no intention to go into much detail; but he would like to take the opportunity of saying that, creditably alike to the Commissioners and to the officials generally, the capital account of their works was nearly 40 per cent. below the average of the capital expended in gas-works in the United Kingdom. The working costs of carrying on their undertaking were extremely low; and when he said that they were 0·1d. per 1000 cubic feet less than the working costs of the Bristol Gas Company, he could give them no higher meed of praise. Their selling price was almost the lowest in the kingdom; and while many municipal authorities had used their gas undertakings, not for the purpose of supplying a good and cheap gas, but for building new town halls out of the profits, or else for bolstering up any of the other—he would not altogether say fallacies in the municipal community—but some of the other ventures which had not been so successful, he was pleased to know that the first consideration of the Corporation of Glasgow was the gas consumers, as it ought to be. Speaking generally for the gas industry, it was quite unnecessary for him to say much about it. They had witnessed a great extension locally; and the same amount of extension, proportionately, was being carried on in the north, in the south, and in the east and west. There was no doubt whatever that there was a great future for the gas industry for lighting, for heating, and, more especially, for motive power; but it was incumbent upon those who had the charge of the administration and the management of gas undertakings to recognize that an essential requirement of the present day was cheap gas. He was pleased to offer them his heartiest congratulations upon the fact that they in Glasgow had sold gas at all times at the lowest possible price, and had thus fostered the industry in a way without which it would be impossible for them to carry out the injunction of their good old motto—"Let Glasgow Flourish."

Mr. CHARLES HUNT, who took the place of Mr. Charles Carpenter, remarked that he was afforded the privilege of saying how greatly he esteemed the opportunity of being present at the inauguration of the great enterprise which had been happily described as a monument to the skill and ability of their late esteemed friend Mr. William Foulis. He had the privilege of enjoying Mr. Foulis's friendship for many years. He had worked with him on several occasions; and he need not point out that he stood in the very front rank of his profession, and that everyone who was associated with him was his fast friend. Might he be allowed to say how greatly they esteemed the graceful act of the Lord Provost in having his son among them that day? He could say to him that the whole of them were his father's friends, that they rejoiced to see him treading in his father's footsteps, and that the best wish they could utter to him was that he would one day occupy a similar position. Of the toast itself, need he state that the practical example given of the vitality of the industry, in the works which they had visited that morning, were an indication that, in Glasgow at all events, gas was not played out? Someone had said that they in Glasgow did not require to go to any other place to learn the art of gas making. Glasgow had taken no mean share in the changes which had occurred in the manufacture of gas. From Glasgow had come one of the most important inventions that they had had relating to the reduction of labour in gas-works—one which had been most usefully employed in many places in England. Not only had the cost of gas making been gradually reduced, but the uses of gas were rapidly extending; and large as had been the increase of consumption in the past, there were among them some who believed that there was a greater future before it, for the use of gaseous fuel was slowly but surely advancing, and they thought the purveyors of coal gas would be the purveyors of gaseous fuel in the future.

Mr. MITCHELL asked to be allowed to say that he, and every member of the Gas Committee, most heartily endorsed all the goodwill that had been expressed towards their young friend, Mr. Foulis, who was there as the representative of Mr. Foulis's family.

Councillor WILLOCK proposed the toast of "The Guests."

Mr. WILLIAM KING, in reply, said the difficulty of his position was greatly increased by the kindness with which the toast had been proposed, and by the splendid hospitality with which the guests had been received that day. This was not the first time that many of them had received hospitality in the city of Glasgow. A few years ago he was one of those fortunate individuals who were entertained at Provan, on the occasion when the works were commenced. Even then they gave promise of the great results which they had that day seen; and in looking at the works now, they could not but be struck by the individuality of their designer. They knew how varieties in character were to be found in handwriting; they knew, also, how character came out in the works of painters; and he thought the same applied to engineers—the characteristics of the designer came out in his works. And if there was one thing which distinguished more than another their deceased friend Mr. Foulis, it was his earnestness and his strong common sense. He was never, as an engineer, known to indulge in fancies which might tend to his own glorification; and he was sure that his professional brethren who were there that day would bear him out in saying that if they turned to those great works, they saw in them the hand of William Foulis. They were works characterized by solidity and by great simplicity of design; and yet, at the same time, there had been no unwise expenditure, and no meretricious ornament. Everything had been well designed, and well adapted for the purpose for which it was intended; and, as a former speaker had said, they would remain as his monument. He was sure that to their friend Mr. Wilson—whom they all rejoiced to see taking his position, and who, he was sure, not only deserved, but would obtain, the confidence of his Committee, and of that great city—and to all those who were near and dear to Mr. Foulis, it would be some alleviation of their irreparable loss to know how highly he was esteemed by his professional brethren, far and wide, and by all those who had the privilege of knowing him. He begged to thank them, and the Corporation of Glasgow, for the magnificent reception they had given their guests. He hoped their works would be, for very many years, most successful—a source of light, heat, and power to the community, every citizen of which was concerned in the welfare of the undertaking.

Mr. ALFRED COLSON also replied. He said he could assure them that among gas engineers there were not two opinions with regard to the undertaking of the Corporation of Glasgow and the magnificent works designed, though unfortunately not completed, by their great Engineer. There was no gas undertaking in the country which held a more honourable position than theirs; and most heartily did he congratulate them upon their new works. It was with pride they looked round them that morning, admiring all they saw—knowing, as they did, that they had been designed, from beginning to end, by their old friend Mr. Foulis. It had, indeed, been most gratifying to his professional brethren to hear the kind tone in which he had been referred to that day. Every word which had been spoken, he was sure, his friend most richly and thoroughly deserved. He would like to congratulate them, and the Committee too, upon the appointment of Mr. Foulis's successor. Naturally, in the gas industry, when the post fell vacant, they were wondering upon whom Mr. Foulis's mantle would fall. There were not two opinions with regard to the wisdom that was exercised in appointing Mr. Wilson. He could assure them that, in the opinion of all of them, they made a very wise choice; and they were convinced that the prosperity which had so far attended the undertaking would be continued under the guidance of Mr. Wilson.

Bailie STEWART proposed "The Engineer." He said they were of opinion that they had in Mr. Foulis the embodiment of light and wisdom in gas engineering. Mr. Wilson, who had been appointed to succeed him, was known to all the world; and he might say that to-day

they were pleased and proud that they had been able to appoint a gentleman who had been associated with Mr. Foulis in his work, and who, they were convinced, would carry on the works with all the success which had formerly attended them.

Mr. MITCHELL said there had been a great deal of eulogy bestowed upon their late Engineer, Mr. Foulis—though not too much—and he would like, before Mr. Wilson rose, that he should know that they had the greatest confidence in him, and the greatest hopes that he would lead the Gas Committee in the future to still greater success.

Mr. WILSON said it was with somewhat mingled feelings of sadness and pleasure that he rose to reply to the toast so kindly proposed by Bailie Stewart, and so cordially responded to by the company. It was a truism of life that one sowed and another reaped; and it seemed to him to be so in this case. They would all have wished that his late chief had been there to reply to the toast, on what, he had no doubt, he would have considered one of the most important occasions of his strenuous life. The sentiment expressed on the front page of the "Souvenir" which they received that day would show that he wished, in unison with those who had previously spoken, to ascribe all honour to Mr. Foulis for the grand work he carried out for the Corporation. The Provan works would, he was sure, ever remain a lasting testimony to his great abilities. He was privileged to be associated with Mr. Foulis for many years, and assisted him in the experiments that were carried out before the details of the works at Provan were decided on; and he could add his testimony to all that had been said that afternoon in praise of the work he so ably carried out. The Provan works, as they would have seen that day, were, in spite of many natural difficulties, well arranged for the business of gas manufacture on a large scale. They were well and substantially built; and he would here like to say a word of praise in favour of Messrs. R. M'Alpine and Sons, and all the other Contractors, for the manner in which they had carried out their various contracts, often in the face of many difficulties. No attempt had been made at ornamentation; the works were for manufacturing purposes, and the design had been suited for the operations performed. The plant installed was all of the best description known, and would, he thought, give most satisfactory results. Of course, there were many details yet to be attended to, and as they went along it might be found that other improvements could be effected; and these would be duly considered. But as far as their experience had gone, things had a hopeful aspect; and he looked forward to the new works at Provan being one of the best and most economical stations of the department. The money expended on the works to date was: For the ground, about £78,000; for the chemical works, about £40,000; for the gas-works, about £550,000—or a total of about £668,000. This looked a large sum: but gas engineers would agree that the money had been well expended. While the cost for the first unit of 12 million cubic feet per day appeared large, as the other units were added the outlay per million cubic feet of gas made would be very moderate. The question had been put to him several times, Were the Corporation wise in spending so much money on gas-works, when the competition of another department was taken into consideration? These doubts, he thought, had been stirred up by the glowing statements made by Bailie Willock at the meeting of the Corporation a short time ago, when he presented the annual accounts of the Electricity Department. In reply to the doubters, he would assure the members of the Corporation that the Gas Department was never in a more healthy and expanding state than at present. The Convener, when he presented the accounts for the past year to the Corporation, would be able to deal with this in detail; but he would just like to say that any competition they encountered only acted like a tonic, and stirred them to greater vitality. It was quite well known—and he thought all would agree it was true—that the Electricity Department, well and successfully managed though it was, dealt only in units; while the Gas Department dealt in thousands. He had not the slightest fear as to the prosperity of their department and the increase of their business; and he was looking forward in the near future to the extension of the already large sections of the gas-works that had been put down at Provan. He begged to return thanks for all the members of the department, who had worked so hard in connection with the new works; and to thank them, on behalf of himself and other members of the staff, for all their kindness to them. He also wished to thank Bailie Stewart for the kind things he had said about himself personally, and all of them for the attention they had given him.

The health of "The Chairman" was then toasted; and the proceedings terminated.

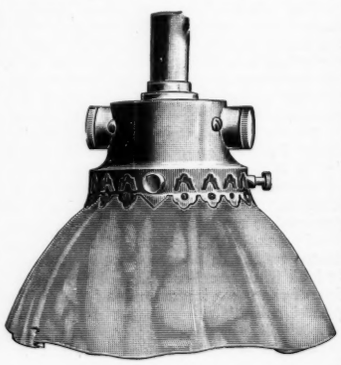
The Royston Gas Company and the Lighting of Ryhill.—A public meeting was held recently at Ryhill, to consider an offer made by the Royston Gas Company for the lighting of the streets. A strong feeling was expressed by several ratepayers that time should be allowed for fully going into the subject. The proposed charges of 4s. per 1000 cubic feet for houses and 3s. 6d. for street-lamps was also thought to be high. Mr. Fisher contended that the present system of lighting by oil-lamps was far from satisfactory, and that gas would be infinitely better and cheaper. Eventually the meeting was postponed for the attendance of a representative of the Company to give full information. A deputation was also chosen to wait upon Messrs. Henry Lodge and Co., of the Ryhill Main Colliery, to see if it would be possible to extend the electric light to Ryhill.

Aldeburgh in Darkness.—After experiencing some trouble with the gas for several days, the inhabitants had to go altogether without a supply last Sunday week. In the afternoon, the crier paraded the streets of the town announcing that no gas would be supplied that evening; and churches, chapels, hotels, and private houses had to be lighted by other means, or not at all. On the following day there was a crowded public meeting, called to take into consideration the failure of the Gas Company for many days to carry out the public and private lighting of the borough. The Mayor was asked to preside; and resolutions were passed calling upon the Corporation to at once summon a meeting of the Corporation Committee, and also calling the attention of the Directors to the great harm inflicted on the town generally. A Committee was appointed to report upon the lighting of the borough.

THE "LIAIS" INVERTED INCANDESCENT GAS-BURNER.

In the "JOURNAL" for July 5, an abstract translation was given of the results of some photometric tests of the "Liais" inverted gas-burner by M. Th. Vautier, as communicated to the Société Technique du Gaz en France. Those tests showed that, with a No. 2 burner, the best illuminating power results were obtained between the pressures of 1·4 and 2·2 inches. They also indicated—and this was the main purpose of the experiments—the relative illuminating powers at different angles. With a No. 2 burner it was proved that in all cases, at three different pressures between the figures mentioned above, the light intensity in carcels was greatest at an angle of 90°, decreasing gradually at the angles of 67·5°, 45°, and 22·5° until the horizontal was reached. A third point that is noticed in the figures is a fairly remarkable agreement between the tests to which four different mantles indiscriminately taken were subjected. But when we turn to the tests of a burner a size larger (No. 3), it is seen that the best results were obtainable at angles of 45° and 67·5°. Of course, for lighting for ordinary purposes, the burners that give the greatest downward illumination, between the angles of 45° and 90° are of the greatest service.

In view of these tests, some description of the "Liais" inverted burner, which is described as a "recuperative" one, will interest those whose attention was attracted by the tests of M. Vautier. The burner is a very simple one; but it has four or five pronounced features—its construction, the material of which it is composed, the methods of heating and regulating the air supply, and its size. It is constructed in three sizes; but all the burners are comparatively small and very light. The lightness is obtained by the body being constructed of aluminium, which is a good conductor of heat; and as to the sizes, the largest is credited with a consumption of only 2½ cubic feet of gas per hour, the second size with 1½ cubic feet, and the smallest with a consumption of 1 cubic foot. Taking Continental tests (the results of trials made in this country not yet being available), the illuminating power is stated at 27 candles per cubic foot of gas consumed, which, if verified, is an excellent result.



The body of the burner, as just mentioned, is made of aluminium, and is (in one piece) in the shape of a **T**, with the gas-nozzle embedded well down into the enlarged chamber formed by the junction of the vertical bunsen tube with the horizontal or air-inlet arms. By this means, it is claimed that the proper mixture of gas and air is facilitated; and that perfect combustion ensues. But this is not all. The air supply finds entrance at both ends of the top or horizontal part of the burner; and as this part is directly over the ascending heat from the flame and incandescent mantle below, it gets highly heated, and the heat in turn is absorbed by the incoming air. Thus both gas and air are delivered to the flame in a hot condition. This is going in a contrary direction to certain inverted burners which have come under notice before, and in which efforts have been brought to bear on the shielding as much as possible of the upper part of the burner from the heat of the flame.

The method of regulating the air supply is another feature. From the illustration (which, by the way, shows the burner fitted with a shade, while in the ordinary way globes are supplied and preferred), it will be seen that the air-inlet ends are capped with thumb-screws; and in the hollow body of these screws are drilled air-inlets, so that the farther out the regulating-screws are brought the greater the amount of air admitted; the closer home they are screwed, the smaller the amount of inflowing air. We have never yet come across an inverted burner in which it was not necessary to regulate the air supply, and that to a nicety, in order to get the best results. In a district where the quality or composition of the gas varies, or pressures vary during the evening owing to the local circumstances of changing demand, regulation of both the air and gas supply is a manifest necessity. In this burner, the regulation of the air can be performed by these end thumb-screws; and then, when the adjustment is obtained at which the highest results are being secured, the thumb-screws can be maintained in position by two little set-screws on the top of the air-inlet arms. The only difficulty that we can see is that, as the regulation must proceed while the burner is alight, it will not be a pleasant matter to have to adjust the screws while hot. A simpler and handier arrangement than this for the regulation of the air supply can surely be devised. The end of the bunsen tube is finished with a steatite tip, just above which is a nickel support for the mantle;

the ring on which the latter is mounted being also of the same metal.

Samples of the burners have been under test for the past three months by Mr. F. R. E. Branston, of 20, Victoria Street, S.W., who is introducing the burner into this country and the colonies; and those that he has had under observation for a length of time show no sign of any detrimental effect from their constant usage. He has also in his possession a report on the employment of the burner (it is a French invention) for railway carriage lighting on the line between Paris and Chartres, in which the "steadiness" and "intensity of the light" are the merits which attracted the particular notice of the engineers reporting. The burner is undoubtedly a good one; but whether the illuminating results are an improvement upon those of its predecessors, is a matter that the photometer and a competent observer must decide.

LAMPS FOR OUTDOOR USE.

On examining the lamps which Messrs. Guest and Chrimes, of Rotherham, have produced for the next lighting season, two things, apart from lighting efficiency, are apparent—first, that the lamps are made of good material; and, secondly, that this material has been subjected to good workmanship. These are of the merits that run through the series of new solid-copper, double-case "arc" lamps for outside lighting, of which we illustrate one sample. Both the inner and outer cases are made of heavy cold-rolled copper, meaning, in other words, strength and durability; and, in fact there is not a joint or part about the lamps which suggests weakness. The reflector, which is seamless and coated with vitrified enamel, is 19½ inches in diameter; but the globe (which is 11 inches in diameter) is rather smaller than is usually adopted for this class of outside lamp. This is by no means a disadvantage, as it is less cumbersome, and so can be readily handled for cleaning, and the expense of replacement is a comparatively moderate one.

A simple device enables the globe to be easily lowered or removed as desired for changing the mantles or for cleaning purposes. This consists of two steel rods secured to the outer cases of the lamps, down which rods an asbestos-covered globe-carrier travels. It is actuated by simply releasing the bayonet joint at the bottom of the lamp, which permits the globe to descend. By this means, the firm obviate the use of steel springs and other fragile parts which are occasionally observed in imported lamps. Our illustration pictures the globe lowered and supported by the rods referred to.

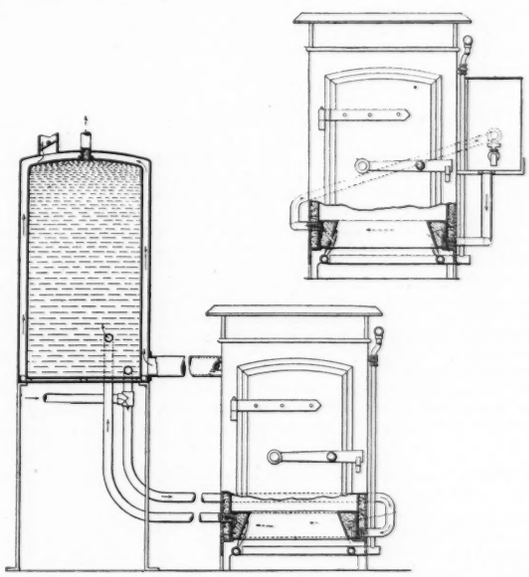
The burners also have their special features. They are fitted with patent non-corrosive heads, combined with a patent clip for taking the mantle-rod. A regulating-screw is also provided, to enable the supply of gas to be adjusted as required for obtaining the best results. The information is given that the lamps are found to act efficiently between such wide variation in pressure as 7-10ths and 30-10ths; and this should make them suitable for all districts under ordinary circumstances of gas supply. Another point is that no special mantles are required; the particular fancy of the user in the matter of "C" mantles being applicable to these burners. The gas supply is controlled by a patent cock at the bottom of the lantern; and measuring from this point to the top connection, the lamp is only 24 inches long. Without the assistance of the reflectors, the lighting efficiency is equal to 25 candles per cubic foot of gas. These are among the features of the lamps which even in this notice we have not exhausted. The aim of the firm is to produce an article which shall sustain their reputation for excellent workmanship at a reasonable price.

REGISTER OF PATENTS.

Gas Cooking Stoves with Circulating Hot-Water Supply.—Sheppard, W. D., of Exeter. No. 19,598; Sept. 11, 1903.

The two illustrations given of this arrangement sufficiently indicate the patentee's proposal. His object is to provide means inside the stove for heating water from the same source of heat or products of combustion as that by which the cooking stove is heated, and at the same time as the cooking is being done. In this way, the heating of the water is "obtained practically without reducing the heat available for cooking purposes." But, if desired, an auxiliary burner may be provided for heating the water when the cooking stove is not required for cooking.

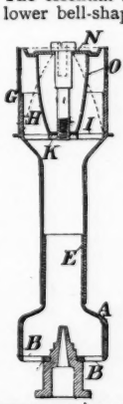
The bunsen gas-burner employed is arranged at or near the bottom of the stove, and extending all round or partly round the stove. There is also a burner which, in addition to extending as usual along two opposite sides of the stove, may also advantageously extend along a third side (say, across the back of the stove opposite the door) as a separate and independent burner.



The illustrations show a gas cooking stove having these improvements applied to it and with a small cistern supported on a bracket upon one side; also a stove where the water supply and water heating arrangement are on the exterior.

Gas-Burners for Incandescent Lighting.—Moeller, J., of Victoria Street, S.W. No. 20,211; Sept. 19, 1903.

The essential features of this burner are the use (in combination) of a lower bell-shaped piece constituting an air-injection chamber, into which the air enters in a direction parallel or nearly so to the direction of the flow of gas from the gas jet and an upper bell-shaped burner-piece having its open end closed so as to leave an annular inwardly flared passage for the exit of the mixed gas and air—the upper and lower bells being joined at their smaller ends by a tube.



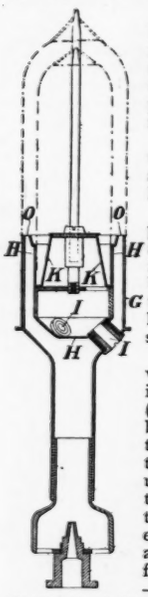
The illustration shows (half-size) a burner consuming "from 4 to 4½ cubic feet of gas per hour at ordinary London gas pressures."

A is a bell-shaped tube with the narrowest part upward and the widest part towards the bottom, which is completely open, except for arms B which support the disc into which is screwed the nipple which supplies the gas and supports the burner. The gas nipple extends into the bell A to a point slightly below the narrowest portion; so that the air entering at the bottom has free and easy access on all sides. The bell ends in the tube E which slides into a larger tube as in the usual bunsen burner construction. The upper portion of the burner consists of a bell-shaped top G the widest end of which faces away from the gas nipple. Within the upper bell is arranged a tubular sleeve H to the bottom of which is secured by arms the small disc K, into which is screwed the rod that supports the top plate N and the bell-shaped piece O. The upper end of the rod may be drilled out to form a tube into which the mantle rod enters. The plate N is smaller in diameter than the upper end of the bell G, leaving an annular space through which the mixed air and gas issue, and at which

the flame is lighted. The top plate N has its edge bevelled inwardly —from 15° to 25°.

Instead of the bell-piece O, a wire gauze screen may be arranged within the upper part of the burner—the gauze in the bell with the largest end facing downwards. This wire gauze prevents any possibility of the flame lighting-back; but with a burner constructed of the dimensions shown, the patentee says he does not find that the flame lights-back even without the wire gauze.

Gas-Burner for Incandescent Lighting.—Moeller, J., of Victoria Street, S.W. No. 20,212; Sept. 19, 1903.



This incandescent gas-light consists of a bunsen burner having an annular passage for the exit of the mixed gas and air; two ring-shaped mantles with open tops being arranged, one on the outside of and the other on the inside of the flame, with an independent supply of air within the annular bunsen flame.

The illustration shows half size) what the patentee describes as his "most preferred form of burner, and of a size consuming 6 to 7 cubic feet of gas per hour at ordinary London gas pressures."

The burner is similar (so far as the air injecting parts are concerned) to the bunsen burner described above—No. 20,211. It is remarked that with air-injection chambers in which the air enters the burner tube in a direction parallel (or nearly so) to the direction of the stream of gas from the gas nozzle hotter flames can be obtained than with other constructions.

Within the bell G is arranged an inner bell H, whose open mouth is at the top of the burner. This inner bell is closed at its inner end, except where (say) three tubes I permit air from outside the burner to pass within the bell. The tubes I in addition to affording a passage for air within the bell fix the same in position concentrically within it. The upper edge of the bell is of a diameter rather less than the inner circumference of the upper edge, thus leaving an annular passage O between the edges of the bells for the exit of the mixed gas and air. The edge of the bell H is turned to such a form as to make the annular opening flare inwardly —preferable to an angle of from 15° to 25°.

Within the bell H is secured a hollow cone K, having its larger diameter (which is equal to the inner diameter of the bell H) facing downwards. All the air, therefore, which enters the inside of the bell H through the tubes I, has to pass through the hollow cone K; and by reason of its conical shape, the air is prevented from impinging on the root of the flame.

For incandescent lighting, two mantles are used with this burner, the flame of which is cylindrical. The mantles must be of ring-form with open upper ends, so as to leave free passages for the rising air and gases.

Suspending Incandescent Bodies for Illuminating Purposes.—Kramer, E., of Berlin. No. 27,937; Dec. 19, 1903.

This device for the suspension of incandescent bodies is intended more especially for use with inverted burners. It is said to present the advantage that by the provision of inclined contact-surfaces in the bayonet-joint fitting, supporting the incandescent body, the ring is rigidly fixed so that oscillation is impossible. In addition, there is arranged between the mantle ring and the burner tube or the collar fixed on it, a packing ring of asbestos which forces the combustion gases to pass through the mantle and not escape along the burner tube or elsewhere, without serving for heating the incandescent body. The form of this packing ring is immaterial—it may be either cylindrical or conical.

Mantles for Incandescent Lighting.—Dewey, H., of Birmingham. No. 5333; March 4, 1904.

This invention refers to means whereby mantles are strengthened, and the lower parts protected against damage. The proposal is to provide at the lower edge of the mantle a hem or folding-over, or otherwise formed thickening, and to carry two or more (interior) asbestos cords from the top loop down to the thickening edge—the cords being equally divided around the mantle, and having their lower ends connected to the thickened edge by metal clips. The cords would be attached to the mantles after they have been practically finished in their manufacture, so that any shrinkage taking place does not interfere with the cords.

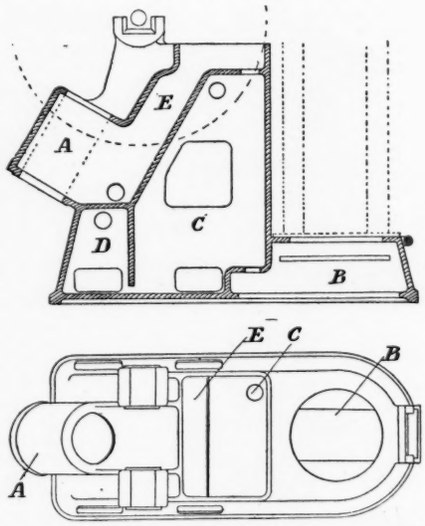
Internal Combustion Engines.—Fairweather, W.; a communication from the Waite Gas-Engine Company, of Milwaukee, U.S.A. No. 14,017; June 21, 1904.

This invention relates more particularly to improvements in internal combustion engines; and it has for one object the production of a two-stroke cycle engine in which the scavenging and charging of the engine are accomplished by a supplemental piston in the cylinder between the main piston and the cylinder head, and controllable by the operator during the scavenging strokes.

Assume that the engine is started by cranking, the movement of each power piston tends to create a vacuum in its cylinder, which is filled with explosive mixture through the intake port when the port is uncovered by the power piston on its out-strokes, as the movements of the supplemental pistons away from the cylinder heads, during the operation of cranking and until combustion occurs, will only be slight owing to the air resistance in the air cylinders. After combustion occurs, the vacuums are created as the supplemental pistons move away from the power pistons and proceed on their scavenging in-strokes. As the main pistons move back on their in-strokes, the explosive mixture is forced through the valved passages in the supplemental pistons into the head-ends of the cylinders which form the combustion chambers, and if the sparking devices are so set that ignition occurs as the cranks pass the inner dead-centre, then (as the main positions reach the limit of their inward movement) combustion occurs, and the supplemental and main positions are driven out on the expansion or power strokes together as one piston. If the cams for operating the exhaust valves are set so that the exhaust valves are opened when the main positions have made seven-eighths of their stroke, then the supplemental pistons at that point are forced back by the compressed air in the air cylinders, and as they reach the limit of their inward movement (having drawn in new charges and scavenged the cylinders of the old charges) are cushioned by the air confined between the ports and the plugs of the air cylinders.

Suction Gas Plant.—Hillenbrand, J., of Ludwigshafen, Germany. No. 11,853; May 24, 1904. Date claimed under International Convention, Jan. 25, 1904.

This invention (relating particularly to installations of suction gas plant) consists of a combined frame and base-plate adapted to constitute a support for an engine and a complete apparatus for generating gas and supplying it to the engine. The object aimed at is to provide means whereby the motor, gas-generator, and all the accessories may be so mounted that the entire plant and engine can be packed and despatched in working order—thus "dispensing with the necessity of erecting and testing the engine at its destination, whereby considerable saving in expense may be effected." A further advantage is presented by the greater ease with which the complete apparatus may be transported from place to place and installed ready to work.



The construction is especially designed for small motors, of from 3 to 20 horse power; and, as shown in the illustration, it consists of a casing or jacket A into which the motor cylinder is inserted. B is an extension of the bed plate, on which a cylindrical generator is supported. C is the washing chamber or scrubber. D is a chamber in which the gas is stored. E is the circulating water chamber. In addition to these "essential features" of an explosion motor which may be assembled in a composite support, further auxiliary members—such as blowers, purifying chamber, and valves, &c.—may also be screwed on to the frame or stand.

Connecting Branch Pipes to Mains under Pressure.—Ham, F. G. S., of Grosvenor Road, S.W. No. 16,016; July 19, 1904.

This is an apparatus for drilling and tapping a gas, water, or other main under pressure (either by one spindle only in the case of a small main, or by two spindles in the case of a large one) and for inserting a special union ferrule into the tapped hole by another spindle. Three spindles are, therefore, fitted in the apparatus—one being a drill, another a tap, and the other a ferrule inserter; but when one of the spindles effects both operations of drilling and tapping, the third spindle is merely a dummy one to close up the third aperture.

Fig. 1 (p. 817) shows the drilling, tapping, and ferrule-inserting apparatus arranged in position on a main. Fig. 2 is a section of the enclosed box-portion containing the tools on the lower ends of the spindles. Fig. 3 is a plan of fig. 2. Fig. 4 is a sectional view of the union ferrule employed for insertion into the main by one of the spindles when a hole has been drilled and tapped by one or both of the other spindles.

The apparatus consists of a kind of stuffing-box A, the lower part of which forms a chamber B, which is closed at the upper part by a revolvable plate C, an enlarged part of which rests upon an inner flange D in such a manner that packing may be placed around the plate and compressed by a ring E and screws F, so as to form a fluid-tight joint or gland. The plate C is provided with three holes (at equal distances from the centre) through which spindles G, H, I, carrying the drill, the tap, and the ferrule, are passed. A yoke J, fixed to the apparatus, carries a screw pivot K, under which either of the spindles can be brought by revolving the plate C as required for successive operation by a ratchet brace or spanner fitted over the squared ends L of the spindles. The spindle holes in the revolvable plate are recessed and grooved at their lower ends to take rubber rings, cup leathers, M, or the

THE "RAPID"
AUTOMATIC COIN COUNTER.

(HENDERSON'S PATENT.) Applicable to Prepayment Meters.

When in use can be placed on any Table.

When not in use can be easily folded away.

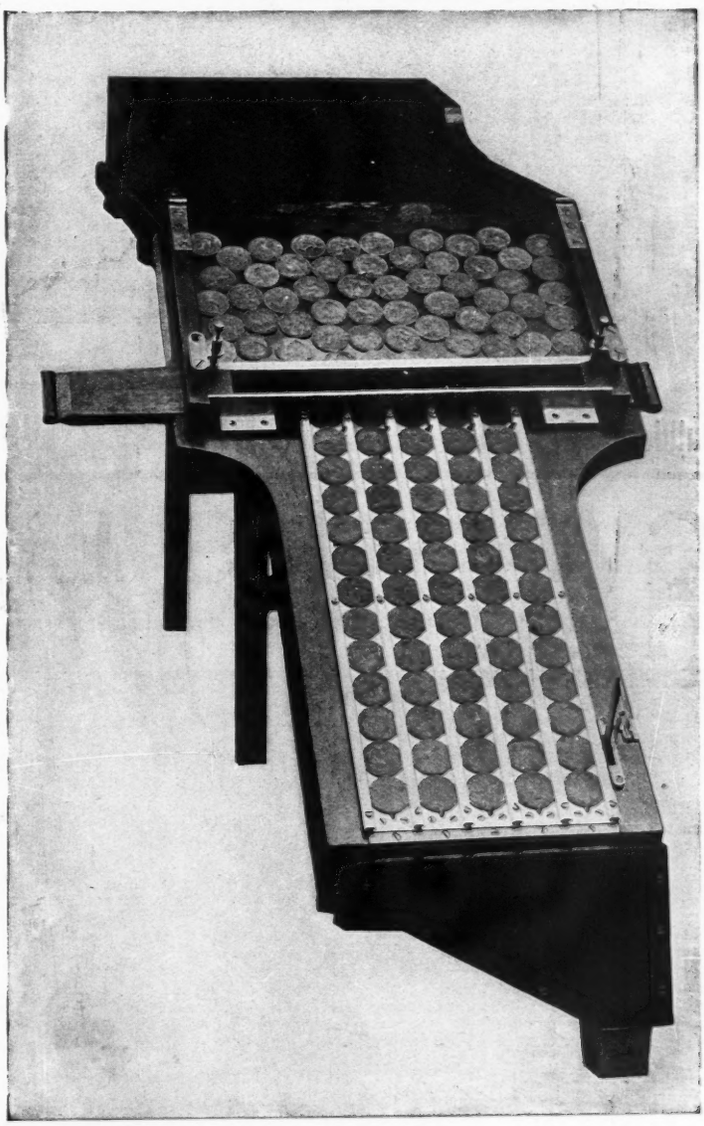
No mistake can be made.

Price £8 0s. 0d. net.

MODE OF USING.

The Coins are emptied on to a top tray, and moved forward by hand on an inclined plane, at the bottom of which is a shuffleboard, which assists the coins into the five slots. Each slot holds 12 coins, and when full it is the work of a moment to release the coins by the handle at the side, which removes a peg at the bottom of each slot, and at the same time raises a pin at the top. The 60 coins fall into the hopper and into a bank bag, which then contains five shillings worth of pence. No counting is required, as the operator can see at a glance whether the slots are full or not.

Can be made in any wood, to suit Office Furniture.



THOMAS GLOVER & CO., LTD.,

GAS-METER MANUFACTURERS,

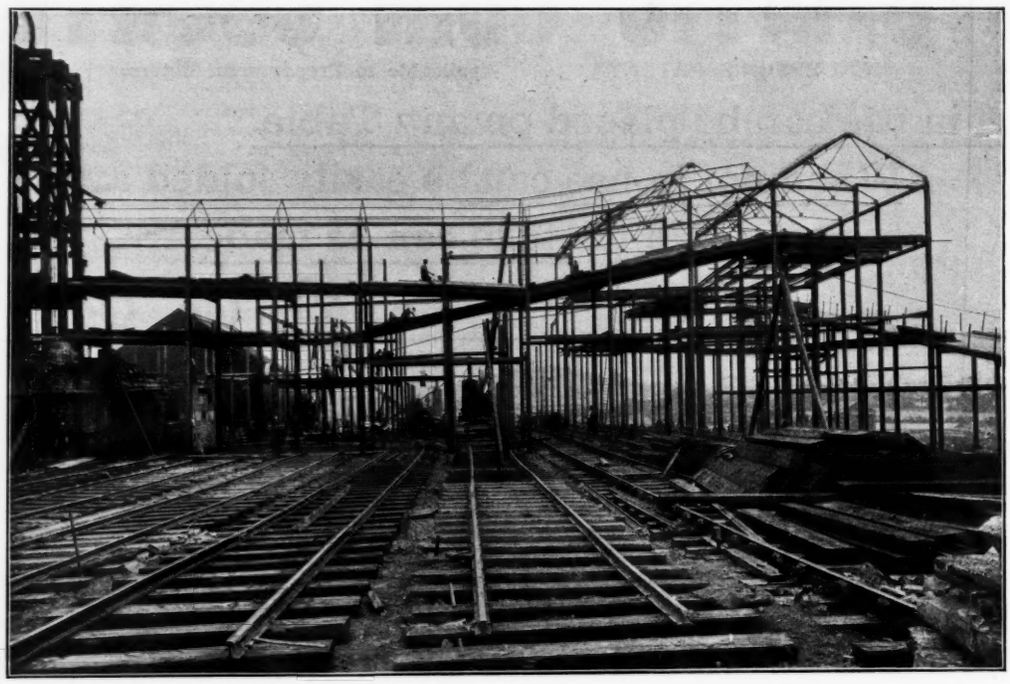
LATE OF CLERKENWELL, NOW 49, QUEEN VICTORIA STREET.

Telegraphic Address: "GOTHIC, LONDON." Telephone No. 6159 Bank.

BRISTOL:	BIRMINGHAM:	MANCHESTER:	GLASGOW:	BELFAST:	MELBOURNE:
28 BATH STREET.	57 & 58, BROAD STREET.	132 & 134, CORN EXCHANGE BUILDINGS.	26, WEST NILE STREET.	8, EXCHANGE PLACE, DONEGALL STREET.	23, WRIGHT'S LANE, LONSDALE STREET,
Telegraphic Address: "GOTHIC."	*Telegraphic Address:* "GOTHIC."	*Telegraphic Address:* "GOTHIC."	*Telegraphic Address:* "GASMAIN."	*Telegraphic Address:* "GOTHIC."	
Telephone No. 1005.		Telephone No. 3898.	Telephone No. 6107 Royal.		Telephone No. 3716.

GRAHAM, MORTON

MAURICE GRAHAM. Works and Head Offices: LEEDS. & CO., LTD.



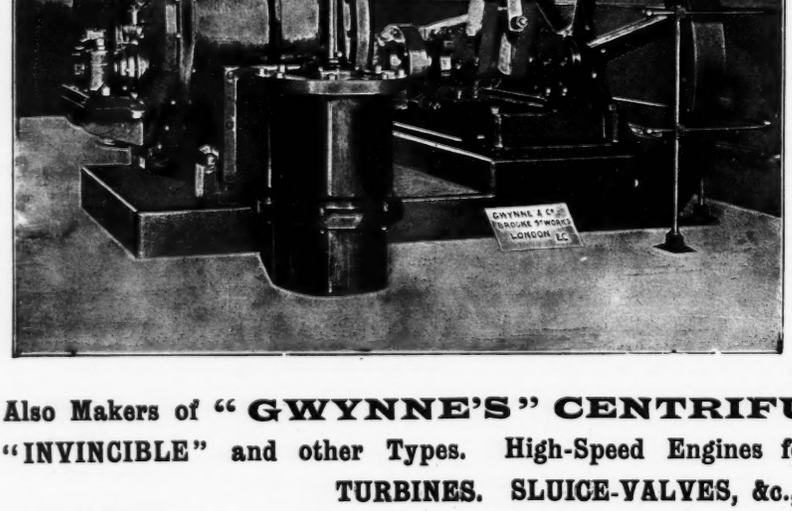
PHOTOGRAPH OF A LARGE PLANT BEING ERECTED BY US AT THE PRESENT TIME.

Builders of HORIZONTAL, VERTICAL, & INCLINED RETORT SYSTEMS.

GWYNNES LTD.,

(J. & H. GWYNNE, Ltd., & GWYNNE & CO., United.)

81, CANNON STREET, LONDON E.C.,
AND
HAMMERSMITH IRON-WORKS, W.



Telegrams: "GWYNNE, LONDON."

Telephone 544 BANK.

Gas-Exhausters

(GWYNNE & BEALE'S SYSTEM)

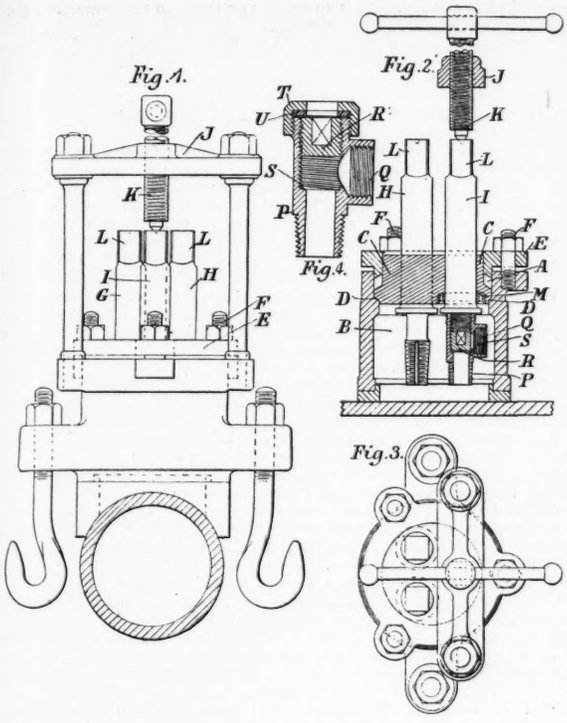
for all capacities from 3000 to 500,000 cubic feet per hour. Driven by Steam, Gas, or Oil Engines.

These Exhausters can be made, when desired, on our Patent Principle, to pass Gas without the slightest oscillation or variation in pressure.

Most of the principal Gas Companies and Corporations in this Country and Abroad have been supplied with these Machines, which are giving unqualified satisfaction in their work.

Write for full Particulars.

Also Makers of "GWYNNE'S" CENTRIFUGAL PUMPS of the "INVINCIBLE" and other Types. High-Speed Engines for all purposes. "GIRARDS" TURBINES. SLUICE-VALVES, &c., &c.



like, so as to prevent leakage up the spindle holes when the main is drilled.

For large mains, three spindles are employed to ensure accuracy and freedom from liability to accident; each operation having a separate spindle and tool—viz., one spindle with a drill, another with a tap, and the other holding the ferrule or union. For smaller mains only two spindles (one for a drill and tap combined and the other for the ferrule) are employed; and in this case the third spindle hole may be filled by a dummy spindle.

The union or ferrule used for insertion into the drilled and tapped hole for connecting a branch pipe is shown in fig. 4. It consists of a barrel portion P and branch Q combined. The barrel has an inner screw-thread for a plug R, which is screwed down on to the seating S to close the passage when the ferrule or union is in position; a cap ring T being screwed on the ferrule over a washer U (as shown) to prevent any leakage past the screw-plug R.

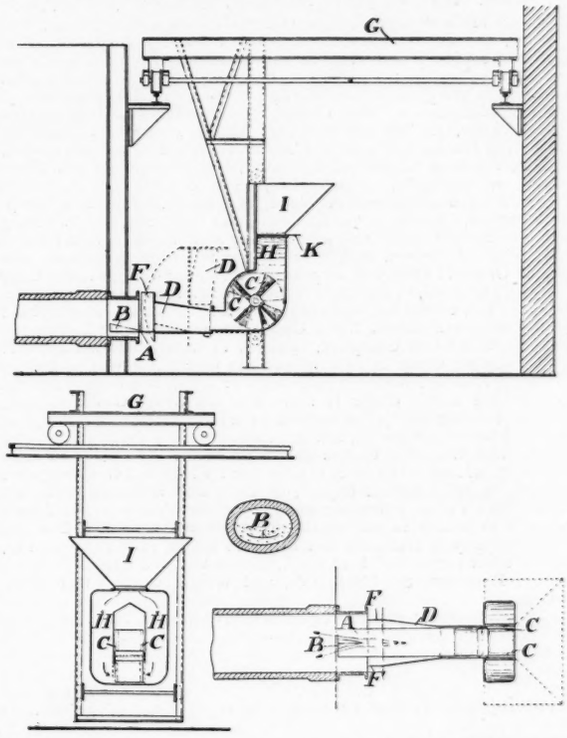
When using the apparatus, the usual saddle-piece is placed upon the main, and the apparatus is firmly secured to the main by a chain and screw hooks. When the ferrule or union has been inserted and the apparatus removed, the branch pipe can be fixed to the ferrule, and the plug R raised (as shown) to open the passage way.

Retort-Charging Machine.—Bollé, C.; a communication from C. Eitle, of Stuttgart, Germany. No. 16,231; July 22, 1904.

This is a modification of patent No. 23,008 of 1903, where a revolving propeller is used in charging the retorts, to which the coal is brought by lateral inclined channels or passages. It is found, however, that when the coal consists of cobbles of different size and slack, the velocity with which it slides in the passages and that with which it enters the retort varies correspondingly with the size of the pieces. The process of charging is therefore not uniform, and in some cases the quantity of coal entering between the propeller blades is too great for the propeller to work freely. In consequence, too, of the lateral entry of the coal between the propeller vanes, the several pieces on their way into the retort have a tendency to settle on the retort bottom along its longitudinal centre line, so as to form a heaped-up charge in the centre of the retort. Further, in consequence of condensation of moisture, deposits of dust take place in the retort mouthpieces, which become mixed with the water, tar, and other liquids collected there, and in a short time prevent the smooth operation of charging. The arrangement of closing the retort completely (during the charging) by the delivery shoot and a cover plate arranged on it also has not proved advantageous, as the generation of gas during the charging is sudden and excessive in amount; so that the quantity of gas generated cannot be conveyed away by the pipes. The object of the present invention is to obviate these defects.

The vanes of the propellers (of which there may be two, three, or more) are provided with lateral sector-shaped sidewalls C at their backs, which, like slides, partially and intermittently cover the outlet openings of the lateral supply channels H during their rotation, and during this time prevent the entry of coal into the propeller casing—the quantity of material admitted depending on the size of these side walls. The front part D of the delivery shoot is arranged to turn upwards on a hinge, and its bottom A is formed as a slide, on which a wedge-shaped saddle B is fixed. The side walls of the delivery shoot are prolonged up to the mouth of the retort; the top stopping at some distance from it.

The method of using this arrangement is as follows: After the delivery shoot D has been turned down in the direction of the retort, the slide A is pushed forward into the retort mouthpiece, so that the bottom is covered by it. The propeller is then started, and coal admitted from the storage hopper I by drawing out the slide K. The coal is thus conducted by the inclined lateral channels H to the vanes of the propeller, by which they are projected over the slide A into the retort. By means of the saddle B the stream of coal is divided; so that it is deflected from the centre line of the retort towards the sides, and settles in a trough-shaped layer higher at both sides and thus covers a greater heating surface, as shown on the section. During this operation, the space between the delivery shoot and the retort-mouth is



closed on three sides, so that the flames can escape only in an upward direction, and "do not inconvenience or injure the stokers." When the charging has been completed, the bottom slide A is drawn back, and the delivery shoot turned upwards. In this position the slide covers the delivery shoot of the propeller in the direction of the retort; so that the air current caused by the vanes of the propeller continuing to rotate is prevented from flowing into the retort, and the covers of the retorts can be closed at once, "whereby a cooling of the red-hot retorts, losses of gas, and explosions are prevented."

APPLICATIONS FOR LETTERS PATENT.

18,617.—Bielefeld, A., "Water-meters." Aug. 29.
18,681.—Petréano, E., "Incandescent lighting or for heating." Aug. 29.
18,693.—Woodroffe, H. B., "Gas mantles." Aug. 30.
18,744.—Pinchbrck, J., "Prepaid gas-meters." Aug. 30.
18,748.—Stevenson, G., "Steam or explosion engine." Aug. 30.
18,796.—Brown, J., "Regenerative flues for gas-retorts." Aug. 31.
18,820.—De Nevéu, E., "Regenerative incandescent gas-lamps." Aug. 31.
18,936.—Airey, G. L. & H., "Acetylene generators." Sept. 2.
18,975.—Roberts, D., and Anstey, H. C., "Generator gas." Sept. 2.
19,001.—Thompson, C. H., "Gas furnaces." A communication from C. L'Hospied. Sept. 3.
19,037.—Ibbotson, J., "Gas producers." Sept. 3.
19,046.—The Chalk Power-Gas Syndicate, Ltd., and Pearson, R., "Continuous and concurrent production of fuel gas and lime." Sept. 3.
19,183.—Brotherhood, C., "Producer gas." Sept. 6.
19,205.—Cooper, E. W., "Gas-engines." Sept. 6.
19,222.—Johnston, A. A., "Manufacture of gas." Sept. 6.
19,255.—Feyens, A. F., "Gas-meters." Sept. 6.
19,258.—Fiddes, W. W., and Aldridge, J. G. W., "Delivering coal into retort-charging machines." Sept. 6.
19,260.—Kuechler, F., and Hubrich, W. R., "Gas-valves." Sept. 6.
19,270.—Smith, E., Jun., "Production of acetylene." Sept. 7.
19,276.—Breckon, J. R., "Producing superior coke in connection with gas-works." Sept. 7.
19,281.—Hulse, E. F., "Incandescent lamps." Sept. 7.
19,295.—Marsden, L. W. J., "Gas-engines." Sept. 7.
19,307.—Gibbons, W. P., and Masters, R., "Manufacture of gas." Sept. 7.
19,340.—Kent, H. A., "Inverted incandescent gas lights." Sept. 7.
19,415.—Cherry, T. W. F., "Gas-engines." Sept. 8.
19,428.—Bellamy, A. R., "Internal combustion engines." Sept. 9.
19,498.—Biheller, S., "Incandescent lighting." Sept. 9.
19,517.—Cross and Son, W., Ltd., and Kirby, J., "Gas-irons." Sept. 10.
19,531.—Mundler, W., "Incandescent burners." Sept. 10.

MISCELLANEOUS NEWS.

GAS AND WATER ORDERS OF LAST SESSION.

The report of the Board of Trade on their proceedings under the Gas and Water Works Facilities Act, 1870, during the past session, has just been issued. It states that in December, 1903, twenty-five applications were made to the Board for Orders—fifteen relating to gas, nine to water, and one to a combined gas and water undertaking. The amount of capital proposed to be authorized was £670,000 by shares and £185,079 by loan; £510,000 of share and £144,913 of loan capital being for gas, and £160,000 share and £40,166 loan capital for water.

The applications for Gas Orders were in regard to Bognor, the Elham Valley, Elstree and Boreham Wood, Finedon, Godalming, Grays, New Hedon, Northampton, Rochford, Romford, St. Margaret's, Stirling, Waltham Abbey and Cheshunt, Worsbroughdale and Worsbrough, and Worthing. Nine applications for Orders—viz., those from Bognor, Elstree and Boreham Wood, Godalming, Grays, Northampton, Romford, Stirling, Waltham Abbey and Cheshunt, and Worthing—were in respect of undertakings already authorized by Special Acts or Provisional Orders, and were for the following purposes: The Bognor Order is chiefly to empower the Bognor Gaslight and Coke Company, Limited, to construct further works for the manufacture and storage of gas, extend the limits of supply, and raise additional capital; the Elstree and Boreham Wood Order is to authorize the Elstree and Boreham Wood Gas Company, Limited, to raise additional capital; the Godalming Order is to empower the Godalming Gas and Coke Company, Limited, to extend their limits of supply and raise additional capital; the Grays Order is to enable the Grays Gas Company, Limited, to construct further works for the manufacture and storage of gas, raise additional capital, and for other purposes; the Northampton, Stirling, and Worthing Orders are to authorize the raising of more capital; the Romford Order is to empower the Romford Gas Company, Limited, to raise further capital, continue and maintain additional works, and for other purposes; and the Waltham Abbey and Cheshunt Order is to authorize the Waltham Abbey and Cheshunt Gas and Coke Company to construct and maintain works, raise more capital, and for other purposes. Five applications—viz., those from Finedon, Hedon, Rochford, St. Margaret's, and Worsbroughdale and Worsbrough—related to existing unauthorized undertakings, and were for the following purposes: The Finedon Gas Company, Limited, sought power to maintain and continue gas-works, and to manufacture and supply gas in the parish of Finedon, in the county of Northampton. The New Hedon Gas and Coke Company, Limited, asked for authority to maintain, continue, and improve their existing gas-works, construct further works, and supply gas within the parishes of Preston and Paull, and the borough and parish of Hedon, in the East Riding of the county of York. The applicants for the Rochford Order sought authority to maintain and continue the existing gas-works at Rochford, in the county of Essex, construct additional works on adjacent land, and manufacture and supply gas. The St. Margaret's Order is to empower the St. Margaret's Gas Company, Limited, to maintain and continue gas-works, construct additional works, and to supply gas in the parish of Stanstead St. Margaret's, and parts of the parishes of Great Amwell and Stanstead Abbots, in the county of Hertford, and in the parish of Roydon, in the county of Essex, and for other purposes. The Worsbroughdale and Worsbrough Order is to authorize the Worsbroughdale and Worsbrough Gaslight and Coke Company, Limited, to maintain, continue, and construct gas-works, and to supply gas within part of the urban district of Worsbrough, and for other purposes. One application—viz., that from Elham Valley—related to the construction of a new undertaking, and proposed to authorize Edward Easton, Lewin Hill, and Sydney Davies Sewell to construct and maintain works for the manufacture of acetylene gas, and to supply such gas within the parishes of Elham, Lyminge, Postling, Saltwood, and Stanford, in the county of Kent.

Objections were lodged against all the applications, except those in respect of the Finedon, Grays, Northampton, and Worthing Orders, and were duly considered by the Board of Trade; inquiries being held in such cases as appeared to be necessary. An Order was granted in each instance, subject to such modifications and amendments as appeared to be required.

Numerous objections were lodged against the Waltham Abbey and Cheshunt Order by owners and occupiers of dwelling-houses in the vicinity of the proposed additional works, and the promoters failed to produce the consent of the Cheshunt Urban District Council; this body having resolved to remain neutral in the matter. The Board of Trade accordingly appointed Sir Alfred E. Bateman, K.C.M.G., to hold a local inquiry into the matter. He reported that, owing to the existence of certain restrictive building covenants in the conveyance of part of the land scheduled to the draft Order, the original proposals of the promoters had been modified, and that consequently very few of the objectors were represented at the inquiry; and the Cheshunt District Council did not appear. He considered that, taking into consideration the slight nature of the local opposition to the modified scheme, the consent of the Local Authority should be dispensed with, and the Order allowed to proceed. The Board of Trade granted the Order accordingly, with certain modifications and amendments.

The consents of all the local and road authorities concerned in the Elham Valley Order were produced. Objections were lodged against the Order on behalf of the South-Eastern Railway Company and the South-Eastern and Chatham Railway Companies' Managing Committee; but, a clause having been agreed between the promoters and the Railway Companies, the objections were withdrawn. There were no other objections; and, after consultation with the Home Office, the Board of Trade decided to grant the Order, but to restrict the area of supply to the parishes of Elham and Lyminge. Such special clauses were inserted in the Order as appeared to be necessary; and the Board reserved power to themselves to modify or suspend the powers of the undertakers in certain circumstances.

In pursuance of the power vested in them by section 4 of the Gas and Water Works Facilities Act, 1870, the Board of Trade dispensed with the consent of the Little Stambridge Parish Council in the case of the Rochford Gas Order, and with the consent of the Cheshunt Urban District Council in the case of the Waltham Abbey and Cheshunt Gas Order above referred to.

In the following Orders, a maximum price of gas was prescribed; power being reserved to the Board of Trade after three years to alter the maximum or to substitute a standard price with a sliding-scale: Elham Valley, 8s., 7s. 6d., and 7s. (per 100 cubic feet of acetylene gas, according to total quantity sold); Finedon, 4s. 9d. per 1000 cubic feet of gas; Hedon, 4s. 6d.; Rochford, 5s. 9d.; St. Margaret's, 5s.; and Worsbroughdale and Worsbrough, 4s. 6d. (4s. for public lighting). A standard price per 1000 cubic feet of gas with sliding-scale was fixed in the following Orders: Godalming, 5s. (below 4s. 3d. in existing and 4s. 9d. in extended limits, for increase of dividend); Stirling, 3s. 2d. (above 3s. 4d. for reduction of dividend and below 3s. for increase of dividend). In the Elstree and Boreham Wood Order, the prescribed illuminating power was reduced from 15 to 14 candles; and in the Stirling Gas Order from 25 to 20 candles. In the Finedon, Hedon, Rochford, St. Margaret's, and Worsbroughdale and Worsbrough Orders, an illuminating power of 14 candles was prescribed.

A clause authorizing the formation of a renewal fund was inserted in the Waltham Abbey and Cheshunt Order; a clause relating to the conversion and consolidation of stock was allowed in the Northampton Order, the undertakers having obtained powers in this respect in a previous Act; and agreed clauses were inserted in various Orders for the protection of road authorities and others, including, in the case of the Elham Valley Order, a clause relating to the purchase of the undertaking by the Local Authority.

The applications for Water Orders were in respect of Bradfield, Cholderton and the district, Elham Valley, Frimley and Farnborough, North Sunderland, Rainham, Sevenoaks, Southwold, and Wetherby and the district. Four of the applications—viz., those from the Frimley and Farnborough district, Sevenoaks, Southwold, and the Wetherby district—were in respect of undertakings already authorized by Special Acts or Provisional Orders, and were for the following purposes: To empower the Frimley and Farnborough District Water Company to extend their limits of supply so as to include the parish of Wingfield, in the county of Southampton, and raise more capital; to empower the Sevenoaks Water Company to acquire and hold further land for the purposes of their water undertaking; to authorize the Southwold Water Company, Limited, to construct additional works, confirm and authorize works already constructed, extend the limits of supply so as to include the parishes of Reydon and Easton Bavents, in the county of Suffolk, sanction the raising of more capital, and for other purposes; and to empower the Wetherby District Water Company to issue any portion of the additional ordinary capital authorized by the Wetherby District Water Act, 1900, as preference shares or stock, and for other purposes.

Two applications—viz., those from Elham Valley and North Sunderland—were for authority to construct new water undertakings, and were for the following purposes: To authorize Edward Easton, Lewin Hill, and Sydney Davies Sewell to construct water-works, and to supply water in the parishes and places of Lyminge, Elham, Postling, Stanford, and Saltwood, in the county of Kent; and to empower the Trustees of Lord Crewe's Charity to construct and maintain water-works, and supply water in the parishes of Ellingham, Chathill, Swinhoe, Fleetham, Elford, and North Sunderland, in the county of Northumberland. Three applications—viz., those from Bradfield, Cholderton and the District, and Rainham—related to existing unauthorized water undertakings, and were for the following purposes: To authorize Herbert Watney to maintain water-works and to supply water in the parish of Bradfield, in the county of Berks; to give authority to Henry Charles Stephens to maintain, continue, and construct water-works and to supply water in the parish of Cholderton and part of the parish of Bulford, in Wiltshire, and parts of the parishes of Shipton Bellinger, Thruxton, Amport, and Quarley, in the county of Southampton; and to empower the Rainham Water-Works Company, Limited, to maintain and continue water-works for the purpose of supplying water within the parishes of Rainham, Upchurch, Hartlip, Bredhurst, and Stockbury, in the county of Kent, and for other purposes.

Objections were lodged against the Bradfield, Cholderton and District, Elham Valley, Frimley and Farnborough, and Rainham applications, and were duly considered by the Board of Trade. An Order was granted in each instance, subject to such modifications and amendments as appeared to be necessary. Agreed clauses were inserted in various Orders for the protection of road authorities and others, with such amendments as the Board were advised to be necessary; including, in the case of the Elham Valley Water Order, a clause relating to the purchase of the undertaking by the Rural District Council. The North Sunderland Water Order contains a clause requiring the water supplied by the undertakers to be properly and efficiently filtered or otherwise treated so as to prevent plumbism. The Southwold Water Order contains provisions requiring the undertakers to discontinue the supply of water for domestic purposes from an existing well after the completion of the new works.

One application related to a combined gas and water undertaking, and it was to empower the Meldreth and Melbourn District Gas and Water Company, Limited, to construct and maintain gas and water works, and to make and supply gas and supply water within the parishes of Meldreth, Melbourn, and Shepreth, in the county of Cambridge. The promoters were unable to obtain the consent of certain of the local and road authorities concerned, and asked the Board of Trade to dispense with such consents. The Board appointed Sir Alfred E. Bateman to hold a local inquiry, and to report to them upon the application. It appeared that the proposed scheme was opposed by the Meldreth and Shepreth Parish Councils, and by the Melbourn Rural District Council; while it was supported by the Council of the parish of Melbourn—the most populous of the parishes concerned—and by the Cambridgeshire County Council. After consideration of the report of the Commissioner,

the Board decided to dispense with the consents of the Rural District Council and the dissenting Parish Councils, and grant the Order.

Five Bills were introduced into the House of Lords on the 2nd of May to confirm the Orders granted by the Board of Trade—viz., the Gas Orders Confirmation Bills (Nos. 1, 2, and 3), the Water Orders Confirmation Bill, and the Gas and Water Orders Confirmation Bill. A petition was lodged in the House of Lords by the Bognor Urban District Council against the Gas Orders Confirmation (No. 1) Bill, in respect of the Bognor Gas Order; and a petition against alterations was lodged by the South-Eastern and Chatham Railway Companies' Managing Committee, in regard to the same Bill, in respect of an amendment which the Board of Trade proposed to make in a clause agreed between the Companies and the promoters of the Elham Valley Gas Order. The petition of the Bognor Urban District Council, which was for the insertion of a purchase clause, was heard by a Select Committee; but the Order was passed without amendment. The Elham Valley Gas Order was not referred to a Select Committee, and the petition against alterations was therefore not heard. The Order was amended as desired by the Board of Trade in Committee of the Whole House. Petitions were also lodged by the South-Eastern and Chatham Railway Companies against the Water Orders Confirmation Bill and the Gas and Water Orders Confirmation Bill, in respect of the Elham Valley and Rainham Water Orders. The petition against the former Order was withdrawn. The latter Order was referred to a Select Committee, and was passed without amendment. No opposition was offered to the remaining stages of the Bill, all of which received the Royal Assent on the 13th of August.

The number of Orders applied for since the passing of the Gas and Water Works Facilities Act, 1870, is 615; and the Board of Trade have made 571, of which 560 have been confirmed by Parliament.

RICKMANSWORTH COUNCIL AND THE GAS-WORKS.

Proposal to Withdraw from the Purchase.

The proceedings at the Meeting of the Rickmansworth District Council last Thursday evening, when Mr. C. BARTON SMITH presided, look like the beginning of the end of the history of the proposed purchase of the Gas Company's works, which, there is every probability now, will remain in the possession of the present proprietors—at least, the District Council are hoping so.

The Company wrote asking the Council to appoint someone to represent them at the valuation of the stocks at the works on the agreed date of the transfer—the end of this month. But the appointment may never be necessary, as Mr. Oddie had given notice of the following motion: "That the Gas Company be forthwith approached with a view to ascertaining the terms upon which they would consent to the withdrawal of the Council from the contemplated acquisition of the gas undertaking."

Mr. ODDIE, in proposing his resolution, said that in considering this matter, the important question they had to take into account was what was the amount they had to supply out of revenue to pay off, in thirty years, the purchase price. For the first five years, it would be £2530; and after that, for the remaining 25 years, they would still have to pay £2143. As everybody knew, the Company's profits during the last two years were respectively £1233 and £1238. From the £2530 he therefore subtracted £1238.

The CLERK: You have to add £68 income-tax.

Mr. ODDIE said to make a round sum he would take £1300, which was the total amount they had to provide. This left a net deficit of £1238 for the first year. Ultimately, they would have a deficit of £1300, after paying interest and capital. He considered the Council were in an impossible financial position in this matter; and it was for them to seriously see if there were any means by which they could get out of it. When the scheme was originally mooted, the idea was that they would not only clear the cost of the undertaking and run it at a profit, but that they would also supply gas at a much less price than was done at the present time. If they had after the first five years to meet a loss of £1300, how were these promises to be fulfilled? Mains would have to be laid to Chorleywood—about 3 miles away. These he calculated would cost £650; and the total cost to go there would be £2000, which sum would also have to be repaid in 30 years. The charge for this was £115 a year. If they supplied Chorleywood with 4 million cubic feet of gas, and the profit was £65 per million, the gross profit would be £260. From this they had to subtract £115, being the annual charge they would have to pay to wipe off the capital they had expended in going to Chorleywood. This left £145. The other question was the general one of expansion. The rate of increase was given at 10 per cent.; but it was really 7 per cent. At 10 per cent., the increase would be 2 millions per annum; and this could not be turned out without expending fresh capital. In this case, the cost per million would be £850. If this were so, and it had to be repaid in 30 years, the charge would be £50. The only points in favour of the scheme were the use of gas by the Council for pumping and the reduction of the leakage. He did not think there was much in the pumping proposal; and as to leakage, Mr. Lomas had told him that the Company were losing 4 million cubic feet of gas a year. But leakage was a thing that they could not stop at once; and it meant that the mains were in bad condition. The total amounts in favour of the scheme were: General expansion, £30; Chorleywood, £145; pumping, £100; leakage, £97—total, £372. The total deficit was as he had mentioned, £1300; so that deducting the £370, they were £1000 or so out of pocket. He thought it was the duty of those who promoted this scheme to reduce the price of gas; and what margin had they with which to do this? He admitted that the scheme was on the whole an excellent one, if the Council had succeeded in getting a proper price. The award was enormous; and if he had been on the Council at the time, he certainly should have tried to at once put a stop to the whole thing. If a satisfactory price had been awarded, the Council would have been justified in going on; but he thought that in this question they had been absolutely beaten. The wisest thing for the Council to do now was to see if they could not get out of the position by negotiation with the Gas Company. Under the Act, they would have to pay a heavy penalty—altogether, nearly £5000. He did not propose that the Council should pay all this; but he believed if they approached the Company in a conciliatory spirit—pocketing their pride, and admitting that they had been beaten—the Company would pay something of the sum.

Mr. A. LOFTS having seconded the motion,

The CLERK supplied some figures that he had prepared. He computed that the annual sum to be found by the Council for the first five years would be £2550 10s., or £25 higher than Mr. Oddie suggested. For the first year, the Council would not have to find the sinking fund; and therefore the payments would amount to £1807, including the Council's bill of costs in opposition. The profit he calculated at £1300, with 10 per cent. increase for the first year. The 10 per cent. was a moderate estimate, because the experts had put the increase at from 11 to 13 per cent. This showed a loss on the first year of £377. The second year they would have to find £2550 10s. Then he took the profits for the first year £1300; and added 10 per cent. increase, £143. The Chorleywood extension he put at the very moderate figure of £100 a year; but owing to the character of the population, the proper figure to put down for the district would be certainly a fourth of the profit of Rickmansworth. In the receipts for the second year, there was a saving on coal of 1s. a ton. The leakage in Rickmansworth was considerable; and it was explained that they would save 8 per cent. in leakage. This would amount to 1,600,000 cubic feet of gas. He had put £200 a year for saving on leakage; and, adding up, they found a total of £1973. This showed a loss on the working of £582 for the second year. So the Clerk went on, until in the sixth year he arrived at a profit of £580 10s. The total loss on the Rickmansworth undertaking in the first five years he estimated at £1636. By adopting the counter proposal, they would have to pay the costs of opposition, £580; the cost of the Company's Act, £1700; their own Act, £1150; for arbitration, £1050—in all some £4480, less £860, which had already been paid in advance. The total loss to the district would be £4530, which was equal to a rate of 4s. 3d. in the pound. Having paid this rate, they would have absolutely nothing to show the ratepayers for the money. They had to face this liability of £3670, equal to a rate of 3s. 5d. in the pound, in addition to losing the £860 which they had already paid out of the rates.

An amendment was moved to the effect that the Council should proceed with the purchase.

The CHAIRMAN remarked that the Council were greatly disappointed with the award. From their previous calculations, they were of opinion that the undertaking would be worked at a profit; and now the actual state of things showed that for five years there would be no profit at all.

On being put to the vote, the amendment was lost, by two votes.

It was next suggested that the Council should adjourn for a week, in order that a disinterested expert should be asked to attend the meeting and give his opinion on the undertaking; but this proposal was not entertained.

The original resolution was then carried by two votes; and subsequently the Chairman and Mr. Oddie were appointed to serve as a deputation to the Directors of the Company.

BISHOP'S STORTFORD COUNCIL AND THE GAS-WORKS.

Rejection of the Proposal to Purchase.

At a Meeting of the Bishop's Stortford Urban District Council last Tuesday—Mr. F. FLINN in the chair—the question of the proposed purchase of the undertaking of the Gas Company, on which the Council had sought the advice of Sir George Livesey, as already reported (*ante*, p. 480), was further considered and disposed of. The following items in connection with the question stood upon the *agenda*: (*a*) To consider Sir George Livesey's supplemental report on the gas-works; (*b*) Mr. Glasscock to move that the question of the purchase or non-purchase by the Council of the gas undertaking be then decided; (*c*) Mr. Carruthers to move that, before finally settling the matter, the Council should take a poll of the ratepayers thereon.

Mr. KENT introduced the first-named subject. He pointed out that Sir George Livesey's first report was based purely upon balance-sheets placed at his disposal; but he said that probably there might be differences when the next accounts came to hand. His second report, after he had seen the works, conflicted only in one point with the remarks which appeared in the newspapers. In the report it was pointed out that it was very necessary to have a new gasholder at a very early period. But in his second report Sir George said there was quite sufficient provision for some years to come, but that after the probable increase of business the first heavy expense would be upon the gasholder. There, in his (the speaker's) opinion, Sir George seemed to show a huge weakness, because if there was to be a great increase of business this was one of the considerations which would prompt the governing body to go in for the purchase of the gas-works. It was a peculiarity that Sir George endeavoured to divide the consumer from the ratepayer. The fact was that the consumer was in every instance a ratepayer. People had asked him (Mr. Kent) why he supported the proposal, and whether he would not be seriously hit if the purchase were made. Last year, when the quantity of gas sold by the Company was 31 million cubic feet, he consumed 1-30th of the whole; yet as so large a consumer, he saw no fear of any increase in price if the Company's business were taken over by the Council. They should take Sir George Livesey's report as that of a man who was acknowledged in the whole gas-making world, and in the municipal life of England, as a person who held strong views against municipal trading. He laid it down that in all gas undertakings acquired by municipal bodies the consumers—at all events over long periods—were generally fleeced for the benefit of the ratepayers. He (Mr. Kent) thought it could be proved

that this was not correct. Both large and small undertakings had to go through periods when they were paying off the formation expenses; and the Local Government Board had made it compulsory that the money borrowed for this purpose should be wiped off in a short period. But everything pointed distinctly to the fact that immediately the corner was turned, and these expenses were paid off, the undertaking started on a paying basis, and enabled the price of gas to be reduced. Therefore, Sir George Livesey, in making the assertion referred to, could only have looked at the subject with a mind prejudiced against municipal bodies. However, he (Mr. Kent) did not blame Sir George so much as the Council, who made a mistake of asking Sir George to say whether or not it was advisable to purchase, and doing so cut the heads off those who brought forward this question. He did not object to consulting Sir George, because he felt he was placing himself in the hands of one of the most competent men on the question of gas management; but he held also that every part of the report Sir George had placed before the Council was coloured in a high degree with prejudice against municipal management. What the Council should have asked was simply: "What are the maintainable profits?" The other portion of the report was not, in his opinion, worth the paper on which it was written.

Mr. GLASSCOCK, in proposing his resolution to decide the question then, said he had no wish to stifle discussion. They had had the subject before them with sufficient figures and evidence, and ample time had elapsed for them to digest them; so that they might safely come to a conclusion upon the purchase or non-purchase of the gas-works.

Mr. CARRUTHERS said his view was that they had had a one-sided report, and he thought that the ratepayers and everyone who was an occupier of a house in Bishop's Stortford should have the opportunity of considering the subject. They had had the Gas Company's side of the question; and he took it that if the Company had desired a man to work on their behalf, they could not have done better than choose Sir George Livesey. He thought the Council should, by a public meeting or a poll, hear what the electors had to say.

The resolution was carried with one dissentient (Mr. Carruthers).

Mr CARRUTHERS then spoke to his motion, that before finally settling the matter the Council should take a poll of the ratepayers. He said he thought the spending of from £50,000 to £70,000 was no small matter; and the electors should have the opportunity of settling the question themselves. It was not before the electors at the last election, the Council had no mandate, and something should be done to enable the subject to be thoroughly threshed out in public.

Several members raised the objection that the motion was out of order.

The CHAIRMAN supported the objection, and asked Mr. Carruthers if he was prepared to move a resolution to clear up the matter.

Mr. CARRUTHERS: Would you be in order in calling a public meeting to ventilate the question?

Mr. BARNARD: That would not meet the position. The procedure will be something like this: Someone will propose that a special meeting be called for the purpose of putting in motion the question of the purchase of the gas-works. If the Council are in favour, certain procedure will follow for the calling of a public meeting and having a poll.

Mr. CARRUTHERS: I move that the course indicated be adopted.

Mr. BARNARD seconded the motion. He explained that under it the forms necessary for proceeding with the purchase of the gas-works would be adopted in accordance with the requirements of the Borough Funds Act. This meant the holding of a public meeting, and probably a poll of the town. So far as he was concerned, he had not expressed any opinion that it was desirable to buy the gas-works or that it was not. But he was certain, when he reviewed the evidence brought before them—including Sir George Livesey's report, and the interview with him, as well as other documents accessible to public men—that there was a strong reason why his motion should be adopted. Hs pointed out that when a gas company went to Parliament for statutory powers, the local authority usually objected, and had a set of conditions laid down in return for the safeguard given to the company. This was so in the present case; and the Council sent a deputation to look after the Company's Bill. What happened? Practically speaking, there were two dominating points raised by the Council's representatives before the Parliamentary Committee. They were: That in this Bill was to be placed one leading feature that was hardly to be found in any other Bill before Parliament within the last few years—viz., the Council were not to pay, on the ordinary conditions of the Lands Clauses Act, the 10 per cent. compensation for the compulsory taking over of the undertaking. Then there was the clause providing that the statutory value—whatever enhanced value there might be to the Company by becoming a statutory concern—was not to be brought into consideration in what the Council might have to pay for purchase. The present was obviously the cheapest moment to purchase, because after a given date it would be out of the question for the Council to avail themselves of these two points, which he considered very important. He concluded with a long comment on Sir George Livesey's report.

Mr. CRISP said he held the opinion that municipalities should be able to take charge of undertakings such as gas-works; but he had had the fear that the award in this case might be so high as to fall heavily upon the town—for a long period, at any rate. He thought that the whole question should be referred to the ratepayers; and he therefore supported Mr. Barnard.

Mr. HOLLAND said he must vote against the resolution. He quite agreed that if the town wished to buy the gas-works and the Council approved, this was the time to acquire them. But he thought they had better not buy, for the concern would be a burden for the next forty years. If they wanted to benefit the generation of forty years hence, their arguments were perfectly good; but they were going dead against the interests of the present generation. He would much rather spend the money they would have to pay away per annum upon something which would benefit the town of the present day. The purchase would be a very expensive bargain, even for £60,000, and it might be more; and it was too heavy a burden with which to saddle the town.

Mr. TAYLOR said he had all along considered that it would not be wise to buy such a property as the gas-works at the top of the market, as it was now; and Sir George Livesey's figures more than anything else convinced him that they would be wrong to attempt to acquire the Gas Company's undertaking at the present time.

Mr. EDWARDS said that, as a user of light, he should vote for the resolution, as he thought the matter should be referred to the electors of the town; but his own opinion was against the purchase, as it would be carried out at an exorbitant price.

After some further remarks,

The CLERK (Mr. T. Swatheridge) read the proper form of the resolution Mr. Carruthers had proposed, which was as follows: "That in the opinion of this Council it is expedient for them to promote a Bill in the ensuing session of Parliament for the acquisition of the Bishop's Stortford Gas Company; and that the Clerk be asked to convene a special meeting for the purpose of complying with the Borough Funds Act."

On this resolution being put, it was lost by a majority of one.

GAS PURCHASE QUESTION AT OTLEY.

As briefly announced in last week's "JOURNAL," the Otley Urban District Council have appointed a Sub-Committee to consider the advisability of promoting a Bill for the purchase of the local gas undertaking. It appears that a prompt decision will be necessary if the Council are to take advantage of the opportunity they now possess of acquiring the concern, as the effect of the purchase clause inserted in the Company's Act of 1901 will cease after the next session.

The Company was registered in 1866, for the purpose of supplying gas in Otley; but in 1889 they obtained an Order to go to Newall-with-Clifton, Farnley, and Weston, while in 1893 they were empowered to furnish gas in bulk beyond their limits of supply. Under the latter Order, Burley-in-Wharfedale take their gas in bulk. In 1901, the Company was dissolved, and re-incorporated with further powers. They were then authorized by Parliament to extend and improve their works to meet the increasing demand; and the Act also provided that the capital should be converted into 5 per cent. standard ordinary stock—the £20,000 of 10 per cent. capital into £40,000 of new stock, and the £4600 of 7 per cent. capital into £6440 of new stock—and that further capital not exceeding £16,000 (including premiums) might be raised as new ordinary stock. The authorized capital is therefore now £62,440, of which £16,000 includes premiums. The subscribed capital is £49,279—£48,940 of 5 per cent. standard ordinary stock, and £339 premiums—the latest issue having been £2500 of ordinary stock, in November, 1902, at an average price of £113 17s. 2d. per cent. The borrowing powers are £15,610. At the end of 1903, there were £6875 of mortgages, together with £4500 of 4 per cent. debenture stock, issued in January, 1902, at par, and redeemable on Dec. 31, 1911, at par. Dividends on the 5 per cent. standard ordinary stock have been paid as follows: 1902, 5¼ per cent.; and 1903, 5½ per cent., with £2782 carried forward. The debit balance of capital account at the end of 1903 was £3500, and the reserve fund amounted to £2633.

The standard price of gas is 3s. 6d. per 1000 cubic feet; but only 3s. is charged, with a discount of 5 per cent. if the account is paid within a month. Further concessions are granted to large consumers. When the amount, exclusive of discount and meter-rent, reaches £50 and under £75, there is a discount of 2½ per cent.; £75 and under £100, 5 per cent.; and £100 and upwards, 10 per cent. A discount of 10 per cent. is also allowed off gas used for engines, if measured by a separate meter. The maximum price chargeable by the Company for gas for public lighting within the urban district of Otley is 6d. less per 1000 cubic feet than the lowest price for the time being charged to any private consumer—in other words, the present price of gas for public lamps is 2s. 0½d. per 1000 cubic feet. The combined districts supplied by the Company contain a population of between 13,000 and 14,000. In the last census, the population of Otley increased from 7838 to 9250; but since 1901 a portion of Newall-with-Clifton has been added to the district. In 1902, the Council obtained a Provisional Order for electric lighting, but have not taken any steps to promote a scheme.

OTTOMAN GAS COMPANY, LIMITED.

The Ordinary General Meeting of this Company was held last Tuesday, at the London Offices, No. 9, Queen Street Place, E.C.—Colonel JAMES LE GEYT DANIELL in the chair.

The SECRETARY (Mr. T. Guyatt) read the notice convening the meeting; and the Directors' report and the statement of accounts were afterwards taken as read.

The CHAIRMAN said that, the shareholders having the accounts in their hands, it was hardly necessary for him to refer back to preceding years for the purposes of comparison, because they could see for themselves that the business of the Company was on a very sound basis, and had been progressing regularly and satisfactorily. He might, however, mention, with regard to the town of Smyrna, that in every department it was showing a great increase of prosperity—whether they looked to the population, or to the extension of business as indicated by the imports and exports, or to the value of land, which had risen to a very striking extent ever since his visit there in 1899. He had been given to understand, upon very reliable information, that the value had more—considerably more—than doubled itself, and that the demand for land seemed to be still growing. In fact, everything had the appearance of increasing prosperity. Coming to the Director's report, it showed that the gas-rental had fallen off, but that the profit had increased. In reference to this, he might explain that, in previous years and at this time last year, though the gas-rental was expressed in sterling, the gas bills were paid in silver; and the difference between the gold and silver had to find its way to the exchange account. From Jan. 1 last, everything had been placed on a gold basis, and this year the item of exchange disappeared altogether. Of course, the reduction in the gas-rental was attributable to the difference

between the old and the new price that the consumers were charged for gas. They could not expect (as those present knew who were practised in the gas-supply business), the consumers to immediately respond to a reduction in price. But they were now responding; and he thought on another occasion that, even putting aside the question of exchange, the increase would be a material one. Looking at the balance-sheet, there were not any very great differences between the items and those in the balance-sheet for the corresponding period of last year. The item of sundry creditors amounted to £1872, against £1774; and the account of the Imperial Ottoman Government was £1913, as compared with £1258. The reserve fund stood at £12,000; the debenture redemption fund at £2095; and the depreciation fund at £8838. The profit brought forward at Dec. 31 last, after paying the dividend, was £2419; and to this they had to add the profit for the past half year of £2750, which made the amount in hand £5169. The dividend it was proposed to pay would require £2625; so that the balance to be carried forward would be £2544. On the other side, the item of sundry debtors was £11,419, which was an increase of about £2000. The stocks, however, totalled to £8280. The investment of the depreciation fund represented £8553, which would be increased by the difference between that sum and the £8838, to which he had referred, on the other side of the account. Turning to the revenue account, the expenditure on coal was £4519, on wages and materials £1149, and on lamp-lighting £720. These items had increased somewhat. "Salaries and office expenses in Smyrna, £1736," would no doubt have caught the eye of the shareholders. The increase had arisen owing to the re-arrangement of the salaries, and to the sundry expenses—legal and otherwise—in respect of the new public lighting contract. It was not necessary to go over the other figures; but the result of the half-year's business was the profit already mentioned of £2750. The volume of business had of late years increased very materially; and he was glad to have with them on this occasion their Engineer and Manager from Smyrna (Mr. John Gandon), in order to tell the shareholders in his presence how much the Directors—and he hoped the shareholders too—appreciated his activity and the vigorous manner and good judgment with which he met whatever circumstances presented themselves. The Chairman concluded by moving the adoption of the report and accounts.

Mr. STEPHENSON R. CLARKE seconded the motion, which was unanimously carried.

Proposed by the CHAIRMAN, and seconded by Mr. H. W. ANDREWS, a dividend at the rate of 7 per cent. per annum, on both classes of shares, was declared.

Mr. A. F. PHILLIPS, in moving a vote of thanks to the Chairman and Directors, said it was exceedingly satisfactory that, notwithstanding the lower price of gas and the reduction of the gas-rental to a gold basis, the decrease in the revenue was so small. The profit was certainly exceedingly satisfactory.

Mr. F. W. CHURCH seconded the motion, which was carried unanimously.

The CHAIRMAN, in his reply, remarked that he hoped, when the shareholders met the next time, they would find the concern in an even more prosperous condition. Continuing, he moved a vote of thanks to Mr. Gandon and his staff in Smyrna, and to Mr. Guyatt.

Mr. A. M. PADDON seconded the motion, remarking that the results of the working spoke for themselves, and showed their great indebtedness to the officers in respect of prosperity. It was the peculiarity of a Company like theirs that one officer had to work at a great distance away, and the other officer had to carry on his duties by correspondence; but, notwithstanding, both Mr. Gandon and Mr. Guyatt were signally successful.

Mr. GANDON and Mr. GUYATT both acknowledged the vote.

The CHAIRMAN said that, before the proceedings closed, reference ought to be made to the death of Mr. Arthur J. King, who, for a great many years, was Secretary of the Company. The Board received the announcement of his death with very great regret. As the shareholders were aware, since 1894 their friend had had a retiring allowance from the Company.

Mr. ANDREWS said he should like to add that Mr. King was a great friend of his. When he (Mr. Andrews) came to the Company in 1873, Mr. King was then Secretary; and the Company in every way felt the value of his services. He was much appreciated by the Board, and it was a great regret to them that Mr. King was no more.

Selby Water Scheme.—A hurriedly convened meeting of the Selby Urban District Council was held last Saturday week, when the Chairman (Mr. Mark Scott) explained that Mr. Hird, of Beverley (whose tender had been accepted for the construction of a conduit at the site of the proposed new water-works on Brayton Barff, near Selby, to carry away the water pumped from the new bore-well), had written that, for professional reasons, he could not accept the contract. As the work is considered to be urgent, the Council, with a view to its being pushed forward with all speed, decided to accept the tender of Mr. J. Smith, of Selby, at an advance on the figure quoted by Mr. Hird.

The Parliamentary Powers of the Tees Valley Water Board.—At the last meeting of the Thornaby Town Council, the Town Clerk said he had received from the Tees Valley Water Board a request that the Corporation of Thornaby, in conjunction with Stockton and Middlesbrough, should pass a resolution authorizing the Board to promote a Bill for the purpose of extending the time for the completion of the Grassholme and Long Newton reservoirs to the year 1914, to increase the reserve fund from £30,000 to £100,000, to extend the Act with regard to the payment of amounts by the Board to the Thornaby Corporation, and to increase the borrowing powers of the three Corporations by £413,618. Alderman Anderson moved that the request be acceded to. The bulk of the money, he said, was required for the two reservoirs named, which had cost more than was estimated. At Grassholme, they had been compelled to go down deeper with the trench; while at Long Newton they had had to put in a concrete bottom, as the only part of the surface that was good was where the borings actually took place. So far as Long Newton was concerned, however, they had nearly twice the area first arranged for. The resolution was carried.

GAS MATTERS IN HALIFAX.

The Past Year's Working—Reduction in Price.

At the last Monthly Meeting of the Halifax Town Council—the Mayor (Alderman Josiah Wade) in the chair—a lengthy discussion took place with reference to a suggestion to reduce the price of gas; the resolution to this effect being eventually carried, as recorded in last week's "JOURNAL."

The Chairman of the Gas Committee (Mr. Wadsworth) proposed that on and after the 1st prox. the price of gas supplied within the borough should be reduced from 2s. 5d. to 2s. 3d. per 1000 cubic feet, and that the price outside the borough should be reduced from 3s. 3d. to 3s. 1d. per 1000 cubic feet—both with the following scale of discounts: All accounts under £10 per quarter, 8⅓ per cent.; £10 and under £25, 10 per cent.; £25 and under £50, 12½ per cent.; £50 and under £75, 15 per cent.; £75 and upwards, 17½ per cent. In doing so, he gave an exhaustive statement dealing with the accounts for the year ending March 31 last (and which are referred to below). They showed that, after allowing for discounts, gas had yielded £95,313—an increase in the sales of £3522 over the previous year. There had been a loss on the tar-works to date of £1513; but, after deducting all charges for interest, sinking fund, and depreciation, there was a net surplus on the gas-works of £24,115, as against £10,049 last year. The past year, he declared, would be one of the years which would be looked back to in days to come with profit and pleasure. In concluding his remarks on the accounts, he said he did not in any way suggest that the undertaking was unstable; but he was personally convinced that money handed over to the rates would, at any rate for a few years, be more permanently beneficial if used to establish a fair reserve fund, which would place the gas estate upon a firm and equitable foundation, similar to the basis upon which all of them desired to build up their own private enterprises. When considering the disposal of this year's surplus profits, he trusted that both his Committee and the Council would not pass over the subject too lightly, but would at least look a little into the future as well as at the present, and by this means endeavour to place the gas estate in its proper position as one of the most successful municipal enterprises in the United Kingdom. The proposed reduction in the price of gas would, he continued, represent a gain to the ordinary consumers of £7850 per annum, or an average reduction of 2½d. per 1000 cubic feet, and, of course, a corresponding loss to the revenue. When he asked for a temporary advance of 3d. per 1000 cubic feet, he had not thought that they would be handicapped in the way that had happened. One factor had, indeed, been a great disappointment. He referred to the question of capital and dear money. Increased interest had had to be paid, and at the gas-works the amount had increased from £11,800 in 1900 to £20,271 in 1904. This increase represented no less a sum than 2¼d. on every 1000 feet of gas sold; or, in other words, the charge for interest had during the past few years advanced from 3·55d. to 5·80d. per 1000 feet sold. Had the charges for interest remained normal, a reduction of 4¾d. per 1000 cubic feet could have been made, and in addition a reserve fund scheme could have been carried put. It might be argued that the profits were still sufficient to justify a larger reduction in the price; but there were special circumstances which had prompted the Committee to adopt a slow-and-sure policy. He did not desire to cast any reflections upon past administration or management of the works; but he had to tell them that the whole of their retort-settings and regenerative furnaces (including the new inclined retorts) would require re-building within the next few years. They would see that a cautious policy was the one which would ultimately yield the greatest permanent benefit to the gas undertaking. He would say here that every single penny of the cost of the improvements and renewals which were now being carried out would be charged against the revenue account; and, while causing a temporary reduction in the profits, they would ultimately yield increased revenue to the undertaking. Further, he was afraid that for some considerable time they must be prepared to face a very depressed market for residuals; and under present prospects, a decrease of £3000 to £4000 per annum would not surprise him. It had been pointed out to him that the proposed new scale of prices and discounts had the appearance of benefiting the large consumers at the expense of small ones; but he could assure them that such was not the case. The sole idea in offering a larger discount to the big consumers was to cultivate the consumption of gas for large engines, which would increase the day load, and thereby reduce the fixed general charges. There were in Halifax several large firms who made their own power gas; but so long as they supplied 17-candle power coal gas at 1s 10¼d. net per 1000 cubic feet, they need not fear the competition of low-grade power gas. It had also been said that they were treating the prepayment consumers unfairly by not allowing them a similar reduction to the ordinary ones. They had known for some time past that the prepayment customer, who was provided with a free cooker, had been receiving more favours than the ordinary one; but the prepayment customer was entirely an experiment, and they now took the opportunity of placing him as far as possible on the same basis as the ordinary consumer. They therefore proposed that he should remain as before; and for the extra 8¼d. per 1000 cubic feet, he got the advantage of a prepayment meter and a free gas-cooker. A comparison showed the position of affairs. The average consumer would burn 9000 cubic feet per annum at 2s. 0¾d., which would produce 18s. 7d., or *plus* meter-rent (1s. 8d) £1 0s. 3d. Deducting 10 per cent. on cost of meter (£1 8s. 3d.) for interest, depreciation, &c., they had a net revenue of 17s. 5d. The prepayment consumer would burn 11,000 feet at 2s. 9d., to cost £1 10s. 3d. With 10 per cent. off cost of meter, &c. (£4 15s. 8¼d.), they got £1 0s. 8¼d., which, less cost of collection (1s. 4d.), produced a net revenue of 19s. 4½d. Without the cooker, the sum would work out at 18s. 10¾d. net. Thus the prepayment consumer had received more than he was really entitled to, and at the expense of the ordinary consumer. In fact, the experiment had not come up to their expectations. He then referred to the manner in which they should

commence to build up an adequate sum, to be placed on one side, or used as floating capital ready to meet any special contingency, and to keep down the interest paid on the bank overdraft, which on March 31 last stood at a sum of £29,246. He asked whether this was a healthy state of affairs for a concern with a capital of over half-a-million sterling. Would any members tolerate for a single moment such a position in their own private undertakings? Would they sell their materials in a good time at so low a price as to leave them only a bare interest on their capital, and ignore the question of placing aside a small surplus to assist them in tiding over bad times when they came along? They were to-day in such a position that, in order to carry on their business, they were compelled to borrow from the bankers something like £30,000; and their charges for interest last year amounted to no less than £1501, while for the previous year they paid for bank interest on overdrafts £2715. They should not rest satisfied until the reserve fund reached not less than 10 per cent. of the capital value of the undertaking. He suggested that they should start the reserve fund by appropriating the surplus profits of last year, and then allow the surplus profits of future years to accumulate until a fairly respectable sum was reached; and he said that if this could be done during the time they were selling gas at the prices now put for their approval, the future success of the Halifax Gas-Works would be assured.

The motion having been formally seconded, Mr. Taylor proposed an amendment that the price of gas should be 2s. 2d. per 1000 cubic feet within the borough and 3s. outside; the present scale of discounts to remain in force. He contended that the Committee were acting in a spirit of fear by simply catering for large consumers; and he felt he was voicing the opinion of hundreds of people when he said that the best form of distributing profits was on a uniform basis. Comparing the receipts from the different classes of consumers, it would be seen that from those whose accounts were under £10 a quarter £60,144 was paid to the Committee, out of a total of over £90,000. They could only do justice by charging one price for lighting and domestic purposes, and one for power, whether the consumers were large or small. In March, 1902, they increased the price of gas by 3d. per 1000 cubic feet. Now they knocked 2d. off for both large and small consumers, but gave the former an additional £1422 over and above what they had before. Mr. Sowood, in seconding the amendment, urged that the proposal was unfair, and that it was out of proportion that a large consumer should pay 1s. 10½d. when the prepayment meter users were charged 2s. 9d.

In the course of the subsequent discussion, Alderman Hey pointed out that in 1898 there was a consolidation of the sinking funds. By that arrangement, the Water Committee sacrificed £4500 per annum, and the Gas Committee benefited by £5400 a year. The Department which could best meet its obligations was benefited, and the one that could least afford it was robbed. He maintained that the Gas Committee should show a clear £5400 a year before they talked of profits; and since 1898 they were over £30,000 behind. Mr. Seed said they talked of the added 3d., but forgot that production cost more because of the higher price of coal. He supported the resolution on strictly business principles; remarking on the great trouble involved in collecting small accounts, as compared with large ones. It was the large consumers who really brought in profit; and they should benefit accordingly. Mr. Parker thought it was their duty to treat every ratepayer with absolute equity, and not give 3s. 6d. in the pound discount to a man who burnt a lot of gas, and 1s. 8d. to the one who did not. There were two gentlemen in the Council who produced their own gas; and they could do it for less than 1s. 10½d. per 1000 cubic feet. They were not likely to take it from the Corporation under these circumstances, so what was the good of the special concessions? Mr. Clay remarked that the Committee were committed to a heavy capital expenditure, and were working for an outlet for their gas. Mr. Collinson, after pointing out that a graduated scale of charges was also fixed by the Water Committee, said the sum from the consolidation of sinking funds should be put to reserve. If this had been done, they would not have had to pay back interest on money borrowed. They were hoping that after the next twelve months they would be able to give back to the consumers the remaining 1d. of the 3d. put on the price in 1902. The next speaker, Alderman Smith, thought the Committee were right in trying to have a reserve fund, and endeavouring to conduct the future so that there would be no such loss as in the past. The undertaking had been used for certain purposes—to sell gas and to pay the rates. Gas consumers had been paying rates twice over—(A Labour member: Hear, hear). He was glad to hear that voice, for some other people had been paying not only twice but three times, because they had paid for the gas consumed in their house and also in their manufactory; so that the large consumers had been put to a great disadvantage and been most unfairly treated. They had paid a much greater sum than the other ratepayers. The large consumers were the ones who were valuable with the rates—it was from them the rates really came. They should deal with them then on strict business lines.

Mr. Wadsworth, in briefly replying to the discussion, said the whole question had been carefully gone into; and he thought the Committee's proposal was for the best. They had decided that if they had a good year, the extra 1d. referred to would be the first thing they would try to do away with. The Mayor intimated that he had recently put a Dowson plant into his works, and was conducting exhaustive tests with it and the Corporation gas. So far the latter had come out best; but the experiments were not yet complete.

On a division, the resolution was carried—40 members voting for it, and 8 against.

The accounts to which Mr. Wadsworth referred with such evident pleasure have been the subject of an interview by a representative of the "Halifax Courier" with Mr. J. Armitage Drake, who said that the result achieved was a great credit to the management of the works (to which, it will be remembered, Mr. J. Wilkinson was appointed in July, 1903) during the year ended March 31 last, and that the confidence of the Committee in this respect had been well founded. From the accounts, it appears that the cost of coal and cannel (86,611 tons) was £36,590, as compared with £39,664 in the preceding year. Carbonizing wages were reduced from £7412 to £6781; and the total coal gas manufacturing charges were £45,705, as against £50,805. For the manufacture of water gas the charge on the present occasion is only £833; while in 1902-3 £3039 appeared under this head. On purifying charges there was a saving of £435; and maintenance of works figured at £8651, as compared with £10,709. Distribution expenses showed an increase of £814, and management and general charges of about £100. Rates and taxes at £6812 showed the enormous rise of £1176. Interest amounted to £18,229, as against £19,246, and sinking fund charges to £6167, compared with £5619.

On the other side, the sum received from the sale of 840,735,800 cubic feet of gas was £103,925; while in the previous year the receipts were £99,668 for 34,000,000 cubic feet less gas. Adjustments for discounts, &c., made the figures respectively £95,313 and £91,791. As to residual products, coke realized £15,321, tar £5143, sulphate of ammonia £8480, and brimstone £93. Meter-rents produced £2016; and other items brought up the total receipts on revenue account to £128,733, as compared with £120,261. As the expenditure amounted to £104,619, there was a net profit on the year's working of £24,114, as compared with an outlay of £110,213 and a profit of £10,048 for the preceding twelve months. The tar-works showed a loss of £1513, which was carried to the gas-works revenue account.

During the year to March 31 last, the cost per 1000 cubic feet of gas sold at the works was 14·58d., as against 19·12d. in the previous twelve months; while distribution, management, rates, interest, sinking fund, &c (less meter-rents), amounted to 5·27d., compared with 5·20d. The total cost was thus 19·85d., against 24 32d. The total receipts for gas amounted last year to 27·26d.; and deducting 0·08d. for the accident fund and 0·44d. for the loss on the tar-works, there was a balance of profit of 6·89d. per 1000 cubic feet of gas sold. In the previous year, the receipts were 27·31d., and the profit 2·99d. Leakage showed an increase in the present accounts; the percentage being 10·04, as compared with 6·76 for the preceding twelve months. On the other hand, however, about 71 million cubic feet more gas was made, though 3400 tons less of coal and 114,000 gallons less of oil was used.

GLASGOW CORPORATION GAS SUPPLY.

Further Borrowing Powers—The Question of Depreciation.

At a Meeting of the Corporation of Glasgow on Thursday last, Mr. R. M. MITCHELL, the Convener of the Gas Committee, presented the accounts of the department for the year ending May 31 last, a summary of which was published in the "JOURNAL" of the 6th inst. He moved their approval, and said he thought the report of the Gas Committee was eminently satisfactory. After what had been said about their gas undertaking on the previous day, at the function in connection with the opening of the new Provan works, he would not say more upon this part of the subject. The only thing he would like to draw their attention to was that their borrowing powers were almost exhausted; and as they would still require from £200,000 to £300,000 to finish their works at Provan, they asked authority to apply to Parliament for additional borrowing powers to the extent of £1,000,000. He had also to move that the price of gas remain during the current year the same as last year. He thought they had done very well; and he was glad they saw their way not to increase the price.

Mr. WILLOCK seconded. If, he said, they took the Gaslight and Coke Company of London, the South Metropolitan Gas Company, and the Manchester and Birmingham gas undertakings, and compared their capital outlay in reference to their output, they would find that in those four large undertakings the capital per 1000 cubic feet of gas sold was 10s. 5½d. In Glasgow, the capital, adding thereto the increased or market value of annuity stock (which had to be so taken into account, and not as it had originally existed) was only equal to 7s. 0·9d. per 1000 cubic feet of gas sold. This, he thought, showed that, as he complained last year, they had written far too much off capital already. While the amount set aside as sinking fund was so large, it might be well that the Corporation should know that, in the matter of depreciation, there had been an average, during the last ten years, of outlay from revenue, upon repairs and renewals, of £95,340 per annum. When they considered that this was equal to over 4d. per 1000 cubic feet of gas, it was a very large item; and it left some room for the consideration of the Manager, and also of the Gas Committee. Some of that money, it might be thought, might go to capital; but it had been the custom hitherto—and he hoped it would prevail—rather than fall back upon depreciation, year in and year out, to place the money aside for repair and renewal. Taking the matter in regard to their estimates, it should be remembered that they began the year with £33,000 to the good, and that they anticipated—he hoped they might be wrong—a reduction from residual products of £25,000. This alone would leave them to come out at the end of this year with £8000. He would be quite willing that they should go forward with an anticipated loss on the undertaking, had it not been that they could quite well afford to depart from the usual custom of writing off. Taking into consideration the amount that had been written off already, it would be a hardship on the citizens, and unjust to the present generation, if they were to increase the price of the gas.

Mr. W. F. RUSSELL was sorry that Mr. Mitchell and Mr. Willock had not more fully explained matters. He thought it was a very bad policy to only write off 1¼ per cent. He believed that the accounts, as originally brought forward, showed 2⅛ per cent. written off, but, presumably, the Committee were influenced to bring it down to 1¼ per cent. He considered this was a wrong step, and although, in forecasting the future, it might have meant that there would be a deficit, he thought this was no good ground for departing from the good habit of writing off 2⅛ per cent., because they had had deficits in the Gas Department before, and they might have them again. He wished to call the attention of the Council to the Stove Department. He was not quite sure that the Corporation realized that this department was being carried on at a loss of something like £5000 a year, or that it was good policy to spend £5000 or £6000 a year upon stoves, on the

ground that the adoption of them increased the consumption of gas. He was sure that the loss was equal to 5s. per head of every householder that used a gas-stove. Again, there were any number of gas shops in Glasgow; but he found that they had one in Union Street, the rent of which was £500. He would ask the Council if this method of advertising had not been continued sufficiently long. He thought gas-stoves might now be left to advertise themselves.

Bailie P. G. STEWART was somewhat surprised that Mr. Russell was so far behind the times. Those shops were not required for advertising purposes at all. They were kept open near to users of gas, for the reception of complaints. Was Mr. Russell aware that in Manchester they were not only losing on the stoves, but were letting them out for nothing? and that in Paisley, which had never been looked upon as a very Progressive place, they were also letting them out free? Gas-stoves were used during the day; and the cost of making the gas consumed in them was small. It would be absurd therefore to do what Mr. Russell proposed.

The several motions proposed by Mr. Mitchell were then agreed to unanimously.

PRIMITIVA GAS AND ELECTRIC LIGHTING COMPANY.

A Proposed New Contract.

The "Financial Times" last Friday reprinted from the "Buenos Ayres Standard" the following particulars in regard to a proposed new contract between the Municipality of Buenos Ayres and the Primitiva Gas and Electric Lighting Company.

Another proposal has been made to the Municipal Commission in reference to the public and private lighting of the city; and it has met with some degree of favour—the Sub-Committee of Public Works having submitted it to the Intendant, with the recommendation that he should negotiate a contract with the Primitiva Gas and Electric Lighting Company, who had presented it, and the Director of Public Lighting, Mr. Dominguez, to whom it was referred by the Intendant, having given a qualified approval of it, subject to the condition that the Company should fix a maximum equitable tariff. Otherwise, he says, it is better to leave things as they are until the Municipal Commission have settled the tariff question which is pending before them. Mr. Dominguez adds, however, that the proposal is not greatly advantageous to the Municipality, who would not attain the desired object of an immediate reduction in the price of gas. On the contrary, the arrangement might have the effect of maintaining the price during the whole term of the solicited concession.

The substance of the proposal is as follows: (1) The Municipality to grant a concession for 60 years, during which period the Company are to have the right to deduct from the net profits £72,000 for interest on the share capital and £9000 for amortization of the capital. (2) At the end of every year, if the balance-sheet should show a surplus of net profits over and above the said two amounts (making together £81,000), it is to be divided equally between the Municipality and the Company; but the share of the former is to be deposited in the Municipal Bank during the remainder of the term of concession, and to be credited to a special account, as a guarantee for making good, out of the deposit and interest, any deficit in the amount required for interest and amortization of the Company's capital as directed by Articles 1 and 5. If any balance-sheet should show that the net profits had exceeded such amount, the Company may reduce their tariffs; but if a deficit be shown, the tariffs may be augmented. (3) The only municipal tax to be imposed upon the Company is 6 per cent. upon their annual gross receipts. (4) The Company are to be permitted to extend their pipes and services all over the city, to acquire the property, pipes, and services of other Companies, and to provide public and private lighting, motive power, and heating, either by means of gas or otherwise. (5) Any new capital raised by the Company is to be expended in extending their works and in expropriations, and is to bear interest at the rate of 6 per cent. and amortization at the rate of 3 per cent. per annum, to be deducted from the net profits in the same way and under the same conditions as are stipulated by Articles 1 and 2 in reference to the existing capital. If at the end of the term of the concession the new capital should not have been completely amortized, the Municipality would have to pay the balance to the Company. Article 6 relates to the quality of the gas to be supplied by the Company.

The present capital of the Company consists of £800,000 in 5 per cent. preference shares and £400,000 in ordinary shares, making together £1,200,000. Therefore, the £72,000 proposed to be reserved for interest would give 8 per cent. interest on the ordinary shares; and as the dividend on these shares declared under the last balance-sheet was, as Mr. Dominguez states, only 5 per cent. (in 1902 it was 3 per cent.), and as the deficit in any year would constitute a charge upon the deposit of the municipal share of the profits under Article 2 of the proposal, it is evident that Mr. Dominguez is right in stating that if the proposal were accepted without amendment the price of gas would probably not be reduced during the term of the concession. The Company would also be able to form a large reserve fund distributable among the shareholders during, or at the termination of, the concession, by means of the investment of the £9000. In 42 years, at 5 per cent., the accumulated fund would be sufficient to pay off the whole of the capital and leave a surplus of £460,000 for bonuses; and during the remaining 18 years the happy shareholders would be entitled to £9000 a year in respect of the amortization reserve, and to one-half of the £72,000 reserved for interest on the capital which would then have been extinguished. A monopoly of all the services would also, probably, by a relative reduction of the administrative expenses now incurred by several Companies, lead to a considerable increase of profits; so that there would be more than sufficient every year to pay the 8 per cent. on the present capital and the 6⅔ per cent. on the additional capital. Certainly, it is necessary that the proposal should be amended by making the reduction of the tariff compulsory on the Company (not optional as proposed) whenever their profits in any year have exceeded the amount required for payment of the agreed interest and amortization of capital.

INCANDESCENT GAS LIGHTING FOR SOUTHWARK.

At the Meeting last Wednesday of the Southwark Borough Council, a letter was received from the South Metropolitan Gas Company with regard to the decision of the Council in July to convert the 1035 flat-flame burners existing in the side streets of the borough to the incandescent system. The Town Clerk had written to the effect that an agreement would be prepared. The Secretary of the Company (Mr. Frank Bush) now replied that no agreement was necessary, and asking the Council to accept as a contract the obligation set out in a former letter from the Company agreeing to carry out the work for £1800, the repayment of which will be spread over a period of five years. During the course of the proceedings, it was explained that the Council now pay the Company £3 3s. 9d. per annum for each of the 1035 lamps in question. The light given by this system is 14-candle power each lamp, producing a total lighting in the whole area of 14,490 candles. If the lamps were altered for incandescent gas lighting, and fitted with No. 4 burners, they would produce approximately a lighting of 60 candles each, or a total light of 62,100 candles, or more than four times the quantity at present afforded. To get the greatest benefit in this direction, it would be necessary to provide a new class of lantern, the cost of which would be £2 each, and the annual cost of maintenance afterwards would be £3 6s. each per annum. The cost of conversion being £1800, and this being allowed by the Company to be spread over five years, the increased charge per lamp for this period would be 9s. 1d. On the completion of the payment of the cost of the alteration, the increased charge over that now in force would be only 2s. 3d. per lamp per annum. The Lighting Committee reported that in the case of the other South London boroughs in which conversion arrangements had been arrived at, no agreement was entered into. It was resolved that the course suggested in the letter should be followed, subject to no objection being raised by the London County Council.

ELECTRIC LIGHT SCHEME NOT ENTERTAINED.

The following letter has been received by the Wood Green District Council from Mr. Noel T. Kershaw, the Assistant Secretary of the Local Government Board, as to their proposed electric lighting scheme.

"I am directed by the Local Government Board to state that they have had under consideration the report made by their Inspector, Mr. Hooper, after inquiry held by him with reference to the application of the Urban District Council of Wood Green for sanction to borrow £43,200, since increased to £43,570. The Board have very carefully considered all the information placed before them by the District Council, and it appears to them upon that information to be extremely doubtful whether the scheme, if carried out, would be likely to prove a financial success. The evidence given as to the probable demand for current was of an unsatisfactory character, for it was first stated that the demand was estimated to be equivalent to 330 consumers at 60 8-candle power lamps per house; but when it was pointed out and admitted by the Engineer that the number of lamps estimated for was far too high considering the class of property to be supplied, the estimate of the demand was altered to 660 consumers at 30 8-candle power lamps per house. It does not clearly appear in what manner either estimate has been arrived at. The Board consider that the District Council, before undertaking a scheme of the magnitude proposed, should obtain more reliable information as to the extent to which the electric light is likely to be taken up. Moreover, the Board are by no means convinced by the evidence submitted to them that the District Council are acting prudently and in the best interests of their district in proposing to erect a generating station for the supply of electricity; and they think that the whole question, including the methods of supply, should be reconsidered by the District Council."

DISAPPOINTING ELECTRICITY AT DUDLEY.

Some dissatisfaction has been expressed by Mr. E. J. Thompson, a member of the Dudley Town Council, at the results of the operations of the municipal electricity undertaking. He said they had been taught to regard the installation with satisfaction and pride, and as one which, in the future, would so assist the town as to counterbalance some of the heavy burdens the ratepayers would have to bear in other directions. It appeared to him, however, that unless the undertaking was placed on a sounder financial basis, there was a danger of being disappointed with the results. The figures given in the electricity supply account for the year ended March last showed a marked falling off in certain directions compared with those for the previous twelve months. The consumption of electricity by the Tramway Company had considerably increased during the past year, which would be a source of satisfaction but for the fact that the average price at which it had been supplied was considerably less, with the result that, while there was a clear profit derived from the Company of £638 the previous year, there was for last year, with a largely increased output, a profit of only £269. The electricity supplied to the Company for the previous year was 805,930 units, at an average sale price of 1·04d. per unit; and the corresponding figures for last year were 10,350,021 and 1·29d. At the same time, in the previous year the cost of production was 1·21d. per unit, compared with 1·23d. this year. He had arrived at these figures after making deductions for dead charges on the expenditure account, and allowing for interest on the mortgages. He also contended that depreciation was not accurately provided for. The arc lamps, he said, were costing the town £586 per annum more than the corresponding number of incandescent gas-lights, and in his opinion the electric light was not so good as gas would be.

Alderman Dunn, in reply, remarked that Mr. Thompson was wrong in his figures. The gross profit in connection with the electricity

supply account for last year was considerably more than for the previous year; being £5012, on which there was a net profit of £655. The reason that the average sale price of the current to the Tramway Company had been less was due to the fact that the consumption had been greater during the daytime, when the rate was lower. The capital expenditure had been £70,000; and a gross profit of £5012 gave a return of 5 per cent, which would absorb £3500, and leave a balance of £1500 to put to a depreciation fund. He ventured to say that there was not one concern in ten that could do this. All the renewals had been paid for out of the current account. With regard to Mr. Thompson's remarks respecting the lighting, he considered that the "illumination from the arc lamps was as superior to that of the incandescent gas-lamps as was the light of the sun compared with that of the moon." He had gone thoroughly into the figures, and was perfectly satisfied. There were only three or four stations in the United Kingdom at which electricity was being generated as cheaply as at Dudley. Mr. Thompson: I challenge anyone to prove that the profits this year are in the same proportion as those of last year. While your price of selling is going down, your cost of production is going up. Mr. Cook pointed out that the first instalment of the repayment of a large loan did not become due until after last year's balance-sheet was prepared, which would make a difference in the comparison of the two years. He contended that the works cost at the Dudley generating station would compare with that of any similar undertaking in the country.

STRIKE AT MESSRS. GRAHAM, MORTON, AND CO.'S.

The employment of a non-Union plater has led to a strike at the works of Messrs. Graham, Morton, and Co., at Hunslet, near Leeds. Since the establishment of the works Union and non-Union men have been employed there. Objection, however, was taken about three weeks ago to the engagement of a non-Union plater who came from the Midlands. The Union men threatened to throw down their tools; and the new man returned home. Last week a second non-Union plater was engaged, when the threat to strike was repeated. Mr. Maurice Graham, the Managing-Director, who had in the meantime returned from a journey, thereupon posted the following notice: "It has been reported to me that during my absence there has been discontent among the men. This shop has always been a mixed shop; and as long as I am Managing-Director it shall remain so. I reserve the right to manage my own business without any interference on the part of the men, and all those who do not wish to work under our rules are at liberty to go." Platers, riveters, and their markers-off, to the number of 250, did not return after the issue of this notice, and they were absent last Friday; but in the other departments the men worked as usual. The works have been picketed by the men on strike; but arrangements have been made to replace the strikers with non-Union and Union men. The firm pay a standard wage for a 53 hours' week, and, complying with the fair-contract clauses, they contend that they have assumed a reasonable attitude.

The foregoing represents the case of the employers. On the other hand, according to the "Yorkshire Post," the men say the firm have broken an agreement which, it is alleged, they entered into, that none other than Union men should be employed. This allegation is altogether denied by the employers. The skilled workmen among the strikers are members of the United Society of Boilermakers and Iron and Steel Shipbuilders, one of the rules of which provides that "any member of this Society instructing any non-Society men, except it be a legal apprentice of our Society, by allowing him to practise with his tools, or otherwise teaching him his business, shall be fined for the first offence 10s., for the second £1, and the third expulsion from the Society." The maximum strike pay is 13s. a week. On Friday afternoon, a delegate of the Union and two of the men called at the offices of the firm to discuss the situation. Mr. Graham said he would see the delegate, but not the men. This proposal did not meet with the approval of the would-be interviewers, who thereupon left the building.

Suicide by Gas in Glasgow.—John Sinclair, a public-house waiter, committed suicide in Glasgow on Monday of last week by means of gas. He had lost his situation in the morning, and going to his father's house in Rutherglen Road, where he resided, he sat down by the kitchen fire. He was left alone for some time, and then he was found on the chair quite dead, with his coat over his head, and in his mouth the indiarubber tube he had detached from a gas-stove.

Heavy Leakage of Gas at Padiham.—Dissatisfaction has been expressed for some time at Padiham at the loss of large quantities of gas. This led the District Council to consult Messrs. T. Newbigging and Son on the matter; and they confirmed the report of the Gas Manager (Mr. A. J. Jackson) that the increased leakage was due to an unsound gasholder and to escapes from the mains. Messrs. Newbigging found that the unaccounted-for gas had ranged since 1891 from 3·29 to 5·92 per cent,; but for the year ending the 31st of March last it had risen to 10·07 per cent. The Sub-Committee appointed to deal with Messrs. Newbigging's report considered that they showed that insufficient attention had been paid to the distributing plant. At the next meeting of the Gas Committee, Mr. Jackson tendered his resignation, which it was agreed to accept. When the matter came before the Council last Thursday, a lively discussion took place on the subject. Two members protested against the resignation being accepted, and attributed the high leakage to an accident. They said the Manager had a good record behind him, having made a profit every year. They considered the reports did not warrant the Sub-Committee in issuing such a report as the one they had presented, as no reflection was cast upon the Manager by Messrs. Newbigging. These were the only members of the Council who voted against the acceptance of the resignation; and it will take effect from the 31st prox.

ARE YOU BUYING
SLOT COOKERS?

It will be WORTH WHILE
writing for our Prices.
They will
INTEREST YOU.

WILLEY & CO., EXETER.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

The thoughts of all people who are interested in gas supply have had their focus in Glasgow this week. To those who enjoyed the privilege of being present at the opening of the Provan Gas-Works on Wednesday, the occasion was one of unalloyed delight; to the far greater number whose fortunes did not allow their presence, it can truly be said that their imagination cannot picture the scene in more appreciative notes than it really was. The day was a most beautiful one, which made everything look at its best, and, besides, helped the numerous guests of the Corporation in their perambulations through the vast works which they were there to see. There was much to be seen—so much that if I were to attempt to describe it in detail, I am afraid I would but weary the reader. But of all that was seen, there was only one feeling, which was one of admiration—admiration of the works themselves, and of the Corporation whose property they are. Probably the first feeling on entering the works was that it is a place of vast distances. There is room for enormous extensions; but it could be plainly perceived that, even with those extensions erected, there will still remain ample room around the various parts, and an absence of the overcrowding which is so common in works of early construction. Then the arrangement of the different portions of the works so as to take advantage of the natural conditions of the site, was a feeling which could not fail to be borne in upon the minds of the visitors. And then, as to the works themselves—well, their details are legion, but those details have been so deftly pieced together that the result is a whole so harmonious that even a severe critic (if there were one) would search in vain for a weakness. Mr. Wilson spoke of "the experiments that were carried out before the details of the works at Provan were decided on." So that all the processes which are to be found at Provan were tried and found suitable before they were introduced there. The conclusion is that they are not speculative works, but are founded upon lines which experience has shown to be safe in working.

This naturally brings up the thought of when the late Mr. Foulis first of all began to apply his mind to the question of what he would place in the new works which he must have had in contemplation as he saw the Dawsholm station getting filled up. We cannot now, unfortunately, fix a period when that may be said to have taken place; and probably we cannot even approximate it. The introduction of his own system of mechanical stoking may most probably be left out of account, as may also his adoption of other appliances which are to be found in all the gas-works of the Corporation. We know that for awhile he worked with carburetted water gas at Dawsholm, and discarded it about the time when he started an oil-gas process of his own, which is still being employed, and for the working of which plant has been erected at Provan. Then he began to experiment with settings of retorts in twelves, from which there was developed the outside producer—and both are to be found at Provan. Taking everything into account, it is probable that it was about the time when he introduced the settings of twelves that his thoughts began to crystallize upon the equipment of the new works that were somewhere to be. This takes us back quite seven years; and we can conjure up, although we may not quite realize, the amount of time and thought which he afterwards threw into what was to be—which he must have known would be—his last, and which he doubtless determined should be his best, effort. But it was not until long after that period that he knew where the new works were to be situated. When he began to make inquiries about a site, he was confronted with the difficulty that it was almost impossible to get an area of ground in the vicinity, sufficiently large and otherwise suitable, which was not undermined by mineral workings.

At last, however, he secured the Provan site; and with it he was quite satisfied, though he was aware that he could have erected works in some other localities at a lesser cost. The works he planned have now been erected, to his designs, though the finishing touches were added by his successor. Mr. Foulis has the credit of the works; to Mr. Wilson will fall the credit of working them. There was so much said in praise of Mr. Foulis on Wednesday, that it is unnecessary to do more than re-echo every word that was uttered. The same may be said of the remarks about his successor. Mr. Wilson obtained the appointment on his merits; but even had he been less worthy of the post, it would have been unwise on the part of the Corporation of Glasgow to have passed by one who knew the workings of Mr. Foulis's mind upon all subjects relating to the gas supply, but particularly upon the Provan works. The future of the works is not in doubt. They will be worked by one who is familiar with all the plant that is in them, and who is, in all respects, quite abreast of his times. As to the Corporation, admiration for them must be felt in that they have ungrudgingly provided gas-works at so prodigious an expense. When we think of the petty squabbles which take place in some municipalities over the expenditure, it may be, of £100, or even less, and recollect that in the Corporation of Glasgow there never was a questioning word uttered with respect to this enormous expenditure, we must feel that the affairs of the Corporation are managed with a business tact and talent which are unsurpassed. Employing only the best men to serve them, they have the good sense to unhesitatingly adopt the recommendations they receive. It would, indeed, be difficult to say which is most to be congratulated in the combination—the Corporation in the service which they get, or the officials in the masters they serve; but probably the better course would be to recognize that the good influences of both act and re-act upon each other, and to congratulate them both.

Perhaps it ought to be recorded how complete were the arrangements for the opening ceremony, and how excellent the entertainment from start to finish. The opening ceremony was so simple that it was over almost before it was realized. To empty a couple of waggons of coal looks, at first sight, scarcely a fitting opening to so large an undertaking; but, in reality, it is the first process in all gas manufacture, and was

GASHOLDERS WITH GUIDE-FRAMING, OR SPIRAL GUIDES ONLY.

PURIFIERS WATER LUTES OR LUTELESS WITH SPECIAL RUBBER JOINT.

MILBOURNE'S PATENT LUTELESS PURIFIERS.

WECK'S PATENT CENTRE-VALVE.

WATER - **CONDENSERS** - ATMOSPHERIC

Milbourne's Patent Grid Valve. Cripps' Patent Grid Valve.

VALVES. *See the new Edition of Walker's Catalogue.*

SULPHATE AND SULPHUR PLANTS. TAR-DISTILLING PLANTS.

SIEVES. SELF-SEALING MOUTHPIECES. TAR-BURNERS.

C. & W. WALKER, Ltd.,

Midland Iron-Works, Donnington, nr. Newport, Shropshire.

110, CANNON STREET, LONDON, E.C.

Telegraphic Addresses: "FORTRESS, DONNINGTON, SALOP." "FORTRESS, LONDON."
Codes used A.B.C. and "A1."
Telephone No. 12, WELLINGTON, SALOP.

therefore exceedingly appropriate. It had the further merit that the process was a short one, and left longer time for the visitors to walk over the works.

There is still more to be said about the Glasgow Corporation Gas Department, for on the day succeeding the opening, the Town Council had before them the accounts of the department for the past year. In Glasgow they do not place the estimates for the current year before the Council. The Gas Committee make up the estimates and work upon them, and report the result to the Council. It will be observed from the report given in another column that Mr. R. M. Mitchell, who has been so able a Convener of the Gas Committee for many years, contented himself with the submission of the accounts, and the expression of his satisfaction at the results they showed. In his opinion, in view of what had been said about the Gas Department on the previous day, it was unnecessary to go into details. Mr. Willock, a member of the Committee, evidently in anticipation of the criticism which followed, gave the reasons of the Committee for not writing off more for depreciation. The criticism, when it was stated, was not so very convincing. The Gas Committee, it is to be assumed, know their work; and they have doubtless reduced the amount set apart for depreciation this year in view of the increased responsibilities attached to the operation of the Provan works, and to allow them to go on without raising the price of gas. But for the former of these reasons, there might have been something to say about the ultimate result of carrying depreciation so far as to have the effect of disturbing the capital account, and of the action of the Income-Tax Commissioners, as tending to prevent the reduction of capital. It would be useless, however, to indulge in any general remarks while it is to be taken for granted that the present arrangement is only tentative. There were the annual grumbles about the supply of gas-stoves and the maintenance of show-rooms; but they were so trifling that further reference to them would be superfluous. The Corporation are fortunate in being able to continue to sell gas at the low price of 2s. 1d. per 1000 cubic feet. If they can go on with that price after the full burden of Provan comes upon their shoulders, they will be fortunate. In the meantime, in the Gas Department, as was said by Mr. Wilson on Wednesday, "things wear a very hopeful look;" for which the community of Glasgow have to thank, on the one hand, the careful attention to business at the works, and, on the other, the excellent—a stronger expression might be used—control of the huge financial side, by Mr. J. Fleming, the Treasurer.

The Committees of both Districts of the Scottish Junior Gas Association have fixed their engagements for the coming winter. The Western District start business on Oct. 8, with the opening address of the President—Mr. J. Lowe, Assistant-General Manager of the Glasgow Corporation Gas Department. At the same meeting, Mr. A. Smith, of Tradeston, will read a paper entitled "Notes on Gas-Works Construction." There will be a further five meetings during the winter, at which papers will be read—a month intervening between them. Midway there will be visits to works, which make the gatherings fortnightly. The first visit will be to the Granton Gas-Works, on Oct. 22. The other places to be visited during the session will be the gas-works at Kilmarnock, Messrs. Wm. Baird and Company's Colliery and Coke-Ovens, Kilsyth, the Provan Gas-Works, and the Shale Works at Niddrie. The Eastern District begin their session with the annual general meeting, which will be held at the Granton Gas-Works on Oct. 1. At this, the President—Mr. A. Masterton, of Edinburgh—will deliver his Inaugural Address; and the company will afterwards have an opportunity of seeing the works. There will be three other quarterly meetings, held in Edinburgh, in January, April, and July. Visits will be made, in the other months of the winter, to the Newbattle Collieries of the Lothian Coal Company, the Limewharf Chemical Works of Messrs. Jas. Ross and Co., of Falkirk, the new gas-works at Peebles, and the Provan Gas-Works. Both programmes are filled up with exceedingly useful subjects for study; and all that is now required to justify the existence of the Junior Association is the attendance of the members. For their own sakes, it is to be hoped they will take full advantage of the admirable opportunities placed before them for extending their knowledge.

Following up what was given with reference to Arbroath last week, I note that at the meeting of the Town Council on Monday Bailie Melvin, the Convener of the Finance Committee, said that they had again had a very successful year in the Gas Department, notwithstanding the great reduction last year of the price of gas from 4s. 4½d. to 3s. 6½d. per 1000 cubic feet—a reduction of 10d. The estimates made last year had stood the test; and after renewing the retort-house roof at a cost of £911, and spending several hundreds of pounds in connection with special renewals of main and service pipes, and various other portions of plant, after carrying the statutory sum of £575 to the sinking fund, and £1225 to the contingency and depreciation account (being £300 more than the liberal sum fixed on by Mr. Gillespie to be carried to that account), they had still a small balance in hand. As a further proof that all this was not merely temporary, the price of gas to ordinary consumers was to be reduced 5d. per 1000 cubic feet. He thought they might congratulate themselves that the Gas Department was in a very flourishing condition. The Council approved of the reduction in price. At the same meeting, the Gas Committee reported that there had been an increased output of gas since May 15 of 1,312,100 cubic feet over the corresponding period of last year, and that the yield of gas per ton of coal was 9068 cubic feet—an increase of 670 cubic feet. Mr. Robbie moved approval of the minutes of the Gas Committee. He said that the reduction in price made a reduction of 1s. 3d. in two years, which, on a consumption of 70 million cubic feet a year, made a saving of £4300. In addition to this, £700 had been put into the suspense account for each of those two years; making a difference of £5000, or 1s. 5½d. per 1000 cubic feet altogether. Provost Grant said this was very satisfactory. The minutes were approved. With regard to this state of matters, the least that can be said is that Mr. A. C. Young deserves to be complimented upon the unbroken success which has attended his management of the gas undertaking in Arbroath.

There was an editorial comment in the "Greenock Telegraph" of

CARBURETTED WATER-GAS APPARATUS

Merrifield—Westcott—Pearson Patents.

The Economical Gas Apparatus Construction Co., Ld.

W. H. PEARSON, Chairman.
W. H. PEARSON, Junr., Deputy-Chairman.
J. T. WESTCOTT, Manager.
L. L. MERRIFIELD, M.Inst.M.E., Engineer.

London Offices: 19, ABINGDON STREET, WESTMINSTER, S.W.
American Offices: TORONTO. TELEGRAPHIC ADDRESS: "CARBURETED, LONDON."

CARBURETTED WATER-GAS ENGINEERS.

The above Company have erected since 1893, or are now erecting, their Universal Type of Carburetted Water-Gas Plant at the following Gas-Works:—

	Cub. Ft. Daily.		Cub. Ft. Daily.		Cub. Ft. Daily.
BLACKBURN	1,250,000	ST. CATHERINES (Remodelled)	250,000	TONBRIDGE	300,000
WINDSOR ST. WORKS, BIRMINGHAM	2,000,000	KINGSTON, PA.	125,000	STRETFORD	500,000
SALTLEY WORKS, BIRMINGHAM	2,000,000	PETERBOROUGH, ONT.	250,000	OLDBURY	300,000
COLCHESTER	300,000	WILKESBARRE, PA.	750,000	TODMORDEN	500,000
BIRKENHEAD	2,250,000	ST. CATHERINES (2nd Cont)	250,000	SALTLEY, BIRMINGHAM (Third Contract)	2,000,000
SWINDON (New Swindon Gas Co.)	120,000	BUFFALO, N.Y.	2,000,000	YORK (Second Contract)	750,000
SALTLEY, BIRMINGHAM (Second Contract)	2,000,000	WINNIPEG, MAN.	500,000	ROCHESTER (Second Contract)	500,000
WINDSOR ST., BIRMINGHAM (Second Contract)	2,000,000	COLCHESTER (Second Contract)	300,000	NEWPORT (MON.)	250,000
HALIFAX	1,000,000	YORK	750,000	TOKIO, JAPAN	1,000,000
TORONTO	250,000	ROCHESTER	500,000	PERNAMBUCO (Brazil)	125,000
OTTAWA	250,000	KINGSTON, ONT.	300,000	MALTON	150,000
LINDSAY (Remodelled)	125,000	CRYSTAL PALACE DISTRICT	2,000,000	DULUTH, MINN. (2nd Cont.)	300,000
MONTREAL	500,000	DULUTH, MINN.	300,000	BROCKVILLE (ONT.)	250,000
TORONTO (Second Contract Remodelled)	2,000,000	CATERHAM	150,000	SMETHWICK	500,000
BELLEVILLE	250,000	LEICESTER	2,000,000	GRAVESEND	300,000
OTTAWA (Second Contract)	250,000	ENSCHEDE (HOLLAND)	150,000	NEWPORT MON. (Second Contract)	250,000
BRANTFORD (Remodelled)	200,000	BUENOS AYRES (RIVER PLATE CO.)	700,000	TORONTO (Third Contract)	750,000
		BURNLEY	1,500,000	TORONTO (Fourth Contract)	1,000,000
		KINGSTON-ON-THAMES	1,750,000	MONTREAL, ONT. (2nd Cont.)	1,800,000
		ACCRINGTON	500,000	HAMILTON, ONT.	400,000

LEEDS, 1,800,000 C. Ft. LEICESTER (2nd Cont.), 1,000,000 C. Ft. NEWCASTLE-ON-TYNE, 1,800,000 C. Ft.

AND, IN ADDITION, 4,000,000 CUBIC FEET DAILY; also Coal-Gas Plants at NELSON, B.C., CHATHAM, BERLIN, NAPANEE, OWEN SOUND, CALGARY, and WINNIPEG.

last Tuesday, to the following effect: "A searching investigation carried on at a series of Committee meetings has resulted, it is alleged, in the discovery of a sum of about £1600, which had not previously been included on the credit side of the accounts when the balance-sheet was made up for the year ending June 30 last. At a recent meeting of the Law and Finance Committee, when the balance-sheets of the various Trusts under the Corporation were considered, it was reported that the Gas Department showed a deficit on the year's working of £380; but the unearthing of the £1600 will enable the Committee not only to wipe off the deficit, but leave them with a credit balance of between £1200 and £1300."

A question as to the dismissal of two men at the gas-works was discussed at a meeting of the Broughty Ferry Town Council on Monday. The men, it is stated, allege that they were dismissed because of their refusal to start work at meal hours five minutes before the proper or agreed-on time. The Gas Committee, after hearing the Manager, approved of his conduct. In the Council meeting, Mr. Westwood moved that the men receive a week's pay in lieu of warning. Mr. Sim, in seconding, said he considered it only fair, seeing the men were required to give a week's notice, that they should receive the same or their pay. Mr. Crystal, the Convener of the Gas Committee, said the men were dismissed for refusing to obey orders; and he thought it would be wrong if the Council were to step in between the Manager and the men. The Council again supported the Manager; the voting being five to four.

The Corporation of Broughty Ferry have, however, a much more serious difficulty before them at present, in connection with their financial position. The "Dundee Advertiser" of Tuesday published the following upon the subject: "It has transpired that the Scotch Office is dissatisfied with the method of financing the huge deficit on the Broughty Ferry gas accounts adopted by the Town Council a month or two ago. Considerable correspondence has passed between the Secretary for Scotland and the Council, in the course of which the former says he is 'quite unable to concur in the Council's policy.' It will be remembered that the deficit of £3700 was met by a rise of 5d. per 1000 cubic feet in the price of gas, and by the practical appropriation of the Castle Green award fund. The cost of the extensions was to be met by a suspense account, providing for repayment in ten yearly instalments; and as these extensions might reasonably be regarded as 'minor' extensions, which the Scotch Office previously recommended should be paid out of revenue, the Council were confronted with an alternative to the scheme adopted, of a rise in the price of gas of about 1s. 3d., or even more, per 1000 cubic feet. The Scotch Office, it seems, ignore entirely the appropriation of the Castle Green fund, and so practically regard the deficit as still to be met. They also point out the want of a renewal or depreciation account, and do not appear to accept the principle of a suspense account. . . It is quite possible that unless the Home Secretary can be induced to give way a little that even during the current year the price of gas may have to be further increased. It is understood that exception is also taken to the carrying forward of the deficit on the Electric Department account. The deficit on that head was over £500." Reverting to the subject two days later, the same newspaper said that the action of the Scotch Office had caused considerable excitement among the ratepayers, and that it was understood that the Secretary for Scotland had asked why the Council did not exercise their power of imposing a contingent rate to meet the deficit. "The raising of the price of gas to the figure necessary to meet the deficit," it is added, "is generally regarded as an impossible solution; and it is probable that unless the Secretary for Scotland agrees to allow the Town Council to carry out their scheme, a contingent rate will be imposed." The Provost and Town Clerk, it is said, have been authorized to ask an interview with the Secretary for Scotland upon the subject. The situation is one of financial disaster. The method adopted by the Corporation to get out of their difficulty is one which will be watched with interest. The raising of the price of gas by so large an amount would be a serious step; and, on the other hand, a contingent rate would be most unpopular.

At the Peterhead Town Council on Monday, the Gas Committee reported that they had had a letter before them from Mr. Robertson, the Gas Treasurer, regarding the valuation of the gas-works as stated in the published accounts, and recommending that the book value of the works, as stated in the capital account, should be reduced upon the debit and net revenue account to the amount of the money borrowed on them, which would bring down the valuation of the works and plant from £20,164 to £18,612. The Committee recommended that this should be done, and the Council agreed. The question of giving an honorarium to Mr. G. Keillor, the late Gas Manager, was to have been considered by the Council; but Mr. Ritchie, who intended to bring the matter forward, said he had endeavoured to gauge the feelings of the members upon it, and finding that the majority were against the proposal, he saw no good in bringing up the subject.

The Denny Town Council agreed on Tuesday to impose a charge of 6d. per quarter as meter-rents upon all consumers who had not used more than 10s. worth of gas in the year preceding the survey, but that no charge should be made if the average consumption were above 10s., even although two or more meters should be used.

The Valuation Appeal Courts have been held this week. So far I have not discovered any appeals with regard to gas-works. At the Leith Court, it was intimated that there was a decrease of £2701 in the valuation of the gas undertaking in the burgh. This is on account of the works having been dismantled. At the Linlithgow Court, it was reported that the valuation of the Gas Company's works had been fixed at £468, against £156 last year.

Sale of Shares.—As the result of a recent auction sale held by Mr. S. F. Dugdall at Brixham, £6000 worth of £10 shares offered in the Brixham Gas Company were sold to local buyers. There was £4000 of 5 per cent. preference and £2000 of ordinary shares; the former realizing from £10 to £10 3s. 6d., the latter £10 per share.

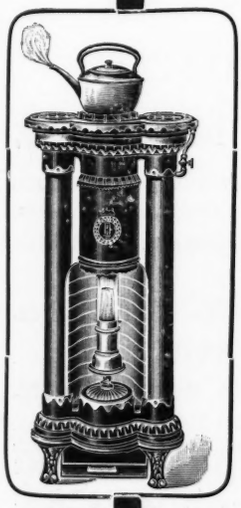
PURE HEAT

WITHOUT SMOKE OR SMELL.

CLARK'S PATENT HYGIENIC

"SYPHON"

GAS STOVES.



The simplest and most economical gas apparatus for producing heat.

It gives invariable satisfaction to consumers, both from efficiency and economy in use.

SEE THE NEW DESIGNS IN—

"SYPHON" GAS RADIATORS,

SOLD AND LET OUT ON HIRE BY ALL THE LEADING GAS COMPANIES.

DROP US A LINE FOR CATALOGUE AND FULL PARTICULARS.

S. CLARK & CO., Patentees and Makers, Compton Works, Canonbury Road, Highbury, London, N. Show-rooms: 58, Holborn Viaduct, E.C. Telegrams: "Syphon Stoves, London." Telephone: 1777 North.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Sept.* 17.

Sulphate of Ammonia.

There has been a fairly active inquiry for sulphate of ammonia during the week, both for prompt and forward delivery; and though business in the latter position has been somewhat limited, owing to the firm attitude of makers, the market as a whole has assumed a rather firmer tone. Current production has found a ready sale; and while prices for delivery at the English ports have been fully maintained, those at the Scotch ports have hardened further, and are now equal to those ruling at the principal shipping ports. Quotations are £11 13s. 9d. to £11 15s. per ton f.o.b. Hull, and £11 17s. 6d. f.o.b. Leith and Liverpool.

In forward delivery, there are buyers at £12 f.o.b. shipping ports, for October-December, and at £12 5s. per ton for January-March; but makers mostly require rather better prices. In London, quotations on Beckton terms remain £12 2s. 6d. per ton for October-December, and £12 5s. to £12 7s. 6d. per ton for January-April.

Nitrate of Soda.

This article is steady on spot at 10s. per cwt. for ordinary and 10s. 3d. for refined quality, and is firm for shipment owing to hardening of freights.

LONDON, *Sept.* 16.

Tar Products.

There has been rather more inquiry during the past week; but prices still remain very depressed all round. In pitch, sales are reported at 27s. per ton f.o.b. London for delivery over the first six months of next year; but makers now seem a little firmer, and it is generally reported that they have declined to offer further quantities at this price. There is a fairly good demand for Yorkshire pitch from consumers in Belgium, where this make appears to command a premium; but prices still remain very quiet, as it is reported that offers are being made for delivery over the first six months of next year at prices considerably lower than those at present ruling. In South Wales, business is reported to have been done over the first six months of 1905 at very low prices; but there is still a fairly good demand for prompt—one or two of the consumers being evidently short of stock, which tends to maintain prices in the Midland district. There has been rather more business doing in benzol. A considerable quantity of 50-90 per cent. was sold during the past week at a price equal to rather over 7d. per gallon f.o.b.; while in 90 per cent., some small sales have been made at 9d. per gallon f.o.b. London, although it is reported that less than this was accepted in the North for home consumption. Consumers here do not seem at all anxious about supplies; and it is generally reported that, so far as prompt is concerned, the demand is not likely to improve during the next few weeks. In anthracene, there is nothing fresh to advise. Several small parcels are being offered for prompt, but consumers appear rather indifferent; and so far as next year is concerned, prices asked by makers entirely preclude business. The demand for solvent naphtha for home consumption continues very good; but prices do not improve. There is still an absence of demand for export in the North of England, which renders prices in that district rather quiet. As regards the specially heavy qualities, the demand is not so good as was the case some little time ago. Further business in carbolic acid is reported at 1s. 9¼d. September-October; but consumers do not seem at all anxious to contract for next year. Doubtless the very low prices which are being quoted for crystals are having a very depressing effect on crude, as there really seems an absence of inquiry from the Continent just at present. The demand for creosote is very good indeed, especially for export. Very large orders are reported to have been taken for early shipment, both from London and the North. Makers are now decidedly firmer in their ideas; and if the necessary barrels can be obtained, a very large quantity will be cleared out during the next two or three weeks.

The average values during the week were: Tar, 17s. to 20s. 6d.; pitch, London, 27s. to 27s. 6d.; east coast, 27s.; west coast, 25s. 6d. to 26s. Benzol, 90 per cent., 9d.; 50-90 per cent., 7d. to 7¼d. Toluol, 6½d. to 6¾d. Crude naphtha, 2⅜d. to 2½d.; solvent naphtha, 8d. to 8½d.; heavy naphtha, 10d. to 10½d. Creosote, London, 1⅝d. to 1¾d.; North, 1⅜d. Heavy oils, 2d. to 2⅛d. Carbolic acid, 60 per cent., 1s. 9d. to 1s. 9¼d. Refined naphthalene, £4 to £8; salts, 20s. 6d. to 22s. Anthracene, "A" quality, 1⅜d. to 2d.; "B" quality, 1d., nominal.

Sulphate of Ammonia.

The market is decidedly steady, and closed with a rather firmer tone, especially for forward delivery. Beckton quote £12 October-December, and do not care to offer for next year at present. South Metropolitan ask £12 2s. 6d. for September-October, and are not at all desirous of selling forward. Business in Hull has been done at £11 15s. and £11 16s. 3d. for October shipment; but makers decline at present to offer forward. Sales are reported in Leith at £11 17s. 6d for prompt and £12 for October-December; while some of the largest makers have declined £12 5s. for October-June. It is rather difficult to fix the actual price ruling at Liverpool, but sales are reported at £11 17s. 6d. and £11 18s. 9d. for prompt.

COAL TRADE REPORTS.

Lancashire Coal Trade.

The adoption of full time in those mills devoted to the manufacture of American cotton has given such an impetus to the demand for engine coal that the collieries have increased their working from three and four to five days per week, which is practically full time. This has proved very acceptable to the miners, and will go far to settle the

THE

MAXIM PATENT CARBURETTOR

FOR ENRICHING GAS IN BULK.

PREVENTS NAPHTHALENE DEPOSITS.

OVER 120 MAXIM PATENT CARBURETTORS HAVE NOW BEEN FIXED.

Among the Companies and Towns supplied are The Gaslight and Coke Company, The South Metropolitan Gas Company, Birmingham, Leeds, Rochdale, Bristol, Sheffield, Oldham, Dundee, Perth, Dunfermline, and many other Works, both large and small, where they have been working in some instances for the past Ten Years.

MORE GAS & SALEABLE COKE PER TON of COAL CARBONIZED is PRODUCED; SAVING CAPITAL, LABOUR, FUEL, WEAR & TEAR, &c.

THE ENRICHMENT IS INSTANTANEOUS AND PERMANENT.

The Carburettor is inexpensive, easily fixed, and entirely supersedes the use of Cannel.

Dealers in Benzol, Carburine, and all other Naphthas and Oils suitable for the Enrichment or Production of Gas.

For Prices and full Particulars, apply to

THE GAS LIGHTING IMPROVEMENT COMPANY, LIMITED,

18, DEVONSHIRE STREET, BISHOPSGATE, LONDON, E.C.

question of what steps might have been taken if the difficulty with the Scotch miners had not been overcome—at any rate, for the present. There has been more inquiry for steam and forge coal; and augmented gas requirements will also increase the demand for fuel. In fact, more coal is at present being required for this purpose. Coke and cannel are in better demand; and it now goes without saying that house coal is finding a stronger market. Altogether the outlook is more promising than for a long time past. Owing to the accumulated stocks at the pits, there has not been any appreciable increase in prices. Quotations for best house coal are 13s. to 14s. per ton at the pit; secondary, 11s. to 12s.; and common, 9s. to 10s. Steam and forge coal is 7s. 6d. to 8s. for common, and from 8s. 3d. to 9s. 6d. for superior qualities. Best slack is firm at 6s. to 6s. 9d.; secondary, 5s. to 5s. 6d.; and common, 4s. to 4s. 6d.

Northern Coal Trade.

There is an increase in the demand for certain kinds of coal; but the export inquiry is not so pressing as it was. Best Northumbrian steam coals are now quoted from 9s. 7½d. to 9s. 9d. per ton f.o.b. Second-class steams are 8s. 6d. to 8s. 9d., and steam smalls from 3s. 9d. to 4s. 1½d. In the gas coal trade, there are now heavier deliveries on the long contracts; and the best of the collieries seem to be nearly fully working. There is thus a little stiffness in the prices for early delivery, at from 7s. 10½d. to 8s. 3d. per ton f.o.b., according to quality. But for long-forward contracts the prices quoted are lower than these. In coke, the market is perhaps a little quieter; and gas coke is rather more plentiful. For export, good gas coke is from 13s. to 13s. 3d. per ton f.o.b. in the Tyne; and there are still some contracts of moment running.

Scotch Coal Trade.

A steady demand continues for all classes of coal. There is a ready outlet; but prices are hanging until the determination of the question of wages, a conference upon which was held in Glasgow last week, but did not have any result. There is therefore no change to record. The quotations are: Main 7s. 3d. to 7s. 6d. per ton f.o.b. Glasgow, ell 8s. to 9s. 3d., and splint 8s. 6d. to 9s. The shipments for the week amounted to 257,073 tons—a decrease of 6554 tons upon the previous week, but an increase of 19,659 tons upon the corresponding week of last year. For the year to date, the total shipments have been 7,918,902 tons—an increase of 244,425 tons upon the same period of last year.

Guildford and the Woking Water Company.—The Guildford Town Council have resolved that notice be served on the Woking Water and Gas Company, in accordance with sub-section 4 of section 38 of the Woking Water and Gas Act, 1899, for the purchase of such portion of the undertaking of the Company as is included within the extended borough of Guildford.

The Lighting of Ormskirk Workhouse.—At the last meeting of the Ormskirk Board of Guardians, a letter was read from Mr. E. D. Martin, the Manager of the Ormskirk Gas Company, stating that his Company would be pleased to hear if the Board would accept a free installation of modern gas lighting at the workhouse. He pointed out that the Urban District Council had accepted their offer to erect modern lanterns and fittings on the Cross. The Chairman said he thought the Company would probably put in three or four lamps. It was resolved to accept the offer.

The South Suburban Gas Company and the Pollution of the Ravensbourne.—A new brick culvert has been constructed at the gas-works at Lower Sydenham, with the view of abating (says a local paper) "the nuisance arising from the pollution of the Rivers Ravensbourne and Poole with the bye-products of gas. Despite this work, it is not thought likely that the trouble will altogether cease until the bed of the river has been cleansed by the removal of the mud which appears to be impregnated with the offensive matter which has been the cause of the unpleasant odours."

Borrowing Powers at Southport.—The Gas Committee of the Southport Corporation have received a letter from the Secretary to the Local Government Board with reference to an application to borrow the sum of £5000 for gas cooking-stoves, meters, &c., inquiring within what period the money would be exhausted, and stating that it was desirable, in order to avoid the necessity of further applications for Provisional Orders, that the amount to be now provided for should suffice for a few years. The Committee, after hearing a report from the Gas Engineer (Mr. Bond) with regard to the prospective demand for gas-stoves, have resolved that the previous resolution be rescinded, and that application be made to the Board for a Provisional Order to amend the Local Acts so as to provide £15,000 for stoves, meters, burners, and other fittings or apparatus used in the supply or consumption of gas for cooking or heating purposes during the ensuing four years.

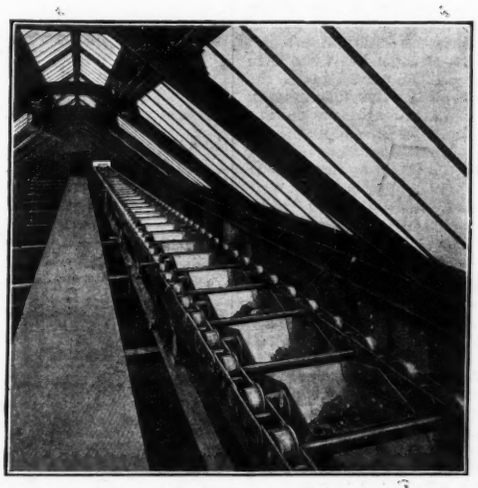
Cost of Arc Lighting in London.—We learn from the "Local Government Journal" that for some time past the Lighting Committee of the Battersea Borough Council have had under consideration the charges made for the supply of electrical energy to, and the maintenance of, arc lamps within the borough. They have ascertained that the annual charges per lamp made by other Metropolitan Borough Councils supplying electricity are as follows: Bermondsey, about £25 (3d. per unit); Fulham, £25; Hackney, £18; Hammersmith, £22 10s.; Hampstead, £28 (500-watt arc lamp); Shoreditch, £31 (nearly); Southwark, £28 7s. (3½d. per unit); and St. Pancras, about £25 (3d. per unit). The Council's Electrical Engineer has, in accordance with the instructions of the Committee, prepared a report showing the cost to the Electricity Department of the street lighting for the year 1903-4 and the estimated cost for the year 1904-5. Taking into consideration the charges for the generation and distribution of electricity, rents, rates and taxes, management expenses, and special charges, during the year 1903-4, a loss of about £779 has been incurred.

One of Three Conveyors in a London Power House.

Two similar Conveyors on order for London County Council.

Suitable for Handling Coke.

4 Installations in Hand.



Several Plants just Erected Abroad.

NEW CONVEYOR CO., LTD.,

SMETHWICK.

Ledbury District Council and the Gas-Works.—Mr. Stephens, a member of the Ledbury Urban District Council, being under the impression that the time had arrived when that body should approach the Gas Company with a view to the purchase of their undertaking, he last week moved that steps should be taken to this end. The proposition was agreed to.

Commencement of the Geltsdale Water Scheme for Carlisle.—After considerable delay, caused by difficulties which have been recorded from time to time in the "JOURNAL," work on the Geltsdale scheme for furnishing an additional supply of water to Carlisle was commenced on Monday last week, under the supervision of the Engineers, Messrs. James Mansergh and Sons.

Workmen's Compensation.—In an application under the Workmen's Compensation Act, at the Lancaster County Court, on Friday, Judge Coventry decided that a workman, injured while removing goods for his employer from a railway waggon, was not entitled to compensation, as the accident must happen on the works of the employer, and the railway goods station could not be shown to be in the joint occupation of the firm in question—Messrs. Blackwell, of London, Contractors for the Lancaster Electric Tramways extension.

Incandescent Gas Lighting at Bath.—The question of the adoption of incandescent gas lighting in the streets of Bath is again receiving attention. Some months ago negotiations took place between the Gas Company and the Surveying Committee of the City Council, with a view to the substitution of incandescent for the present flat-flame burners; but they were broken off because the parties could not arrive at an agreement as to the cost of maintaining the mantles. It is now suggested that the subject should be re-opened; and as, in the interval, there has been a reduction in the price of gas, it is hoped that terms may be arranged which will lead to an improvement in the lighting of the city.

Electric Lighting in Marylebone.—The London County Council have sanctioned the borrowing for 42 years by the Marylebone Borough Council of £340,405 for electric lighting works, subject to the latter body's providing out of a sinking fund, or from the maintenance account, for all renewals and replacements, during the currency of the loan, of plant, machinery, and works. The loan is required by the Council for the provision of a generating station within the borough. The County Council have also sanctioned a loan for 38 years of £48,545, the estimated cost of bringing the existing plant into working order; and a loan for ten years of £44,850, for meters or alterations to existing meters consequent on change of pressure. All these loans are, of course, in addition to the loan of £1,212,000 already incurred to pay the Metropolitan Electric Supply Company for their Marylebone property and goodwill under the arbitration award.

Fatal Accident at the Swansea Gas-Works.—An inquest has just been held on the body of a labourer who died as the result of an accident sustained at the Swansea Gas-Works on the 31st ult. Deceased, who was in the employ of Messrs. Drakes, was engaged hoisting bricks by means of a sling from the ground to scaffolding about 25 feet high, in connection with the erection of a new retort-bench, when he apparently lost hold of the rope, and the sling and bricks fell upon him, fracturing his skull. Mr. Thornton Andrews, the Engineer of the works, said he had warned the foreman in charge of the job as to the dangerous manner in which the bricks were being raised, seeing that the man was directly underneath. In summing up, after an exhaustive inquiry, the Coroner said the use of the sling in question was a dangerous method of heaving bricks. The Jury returned a verdict of "Accidental death," and unanimously condemned the way in which the work of hauling the bricks was carried out. They also thanked Mr. Thornton Andrews for the information he had given.

Braintree Water Supply.—The subject of maintaining the water supply of Braintree, in view of the probable further growth of the population, has lately been under the consideration of the Urban District Council. It appears that ever since the present system of supply was inaugurated in 1856, there has been a gradual diminution of the head of water in the wells, though on no occasion has there been any shortage. At the last meeting of the above-named body, the Chairman of the Water Committee (Mr. Row) stated that the Surveyor advised that the pumps should be lowered and new machinery put in; and the Committee recommended that Mr. Percy Griffith, M.Inst.C.E., who had succeeded the late Mr. Jabez Church, the Engineer who sank the wells, should be engaged to report as to the best way in which to extend the supply. The Surveyor stated that at present they were pumping from 100,000 to 120,000 gallons of water daily, and to do this 12 hours' pumping was necessary. For two hours the pumps, working at full speed, would lift 14,000 gallons per hour, and afterwards about 9000 gallons per hour. The recommendation was agreed to.

District Councils and the Levying of Rates.—A curious state of affairs is said to have arisen with regard to the water supply of Aughrim and Rathdrum, two towns in Co. Wicklow. Some time ago a scheme was promoted by the former place; a portion of the cost being borne by the landlord (the Earl of Meath), while the Rathdrum District Council, as the local Sanitary Authority, furnished the remainder of the money. When the work was carried out, some parties took the water into their houses; and afterwards the District Council put on a water-rate for such consumption. In adopting this course, they followed the advice of their legal adviser, and worked under the Public Health Act. When, however, the rate came to be collected, most of those against whom it was levied struck against the payment. A test summons has been issued; and it is anticipated that at the hearing of the case some interesting points under the Local Government Act and the Public Health Act will be raised. In the first place, the power of the Sanitary Authority to make a charge at all for the use of the water will be challenged. The procedure adopted by them will also form the subject of legal argument; while the most important point to be raised will be that of the power of the District Council to levy and collect a rate under the Local Government Act. The summons will, in the first instance, be heard at the Petty Sessions; but it is believed the case will be taken to the Superior Courts for a decision on the legal points raised.

The "MAIN"

Gas Cooker

WITH LATEST DEVELOPMENTS.

SPECIAL FEATURES.

OUR NEW PATENT ENAMEL is guaranteed free from Lead or other Poisonous Chemicals.

Inside Fittings, Porcelain Enamelled.

Can be supplied with Moveable Burners, if desired.

R. & A. MAIN, LTD.,

LONDON: 49, Queen Victoria Street. | GLASGOW: 26, West Nile Street. | FALKIRK: Gothic Works.

Suffocation by Gas at Brighton.—A strange tragedy was discovered at Brighton on Saturday morning. On the previous night, an aged couple, giving the name of Hill, engaged a room at a boarding-house in Black Lion Street, and asked that they should not be called early. As nothing was seen of them by noon on Saturday, the landlady, becoming suspicious, had the bedroom door forced open. Then it was found that the room was full of gas. The man, who was about 70 years of age, was already dead; while the woman was unconscious and only just alive.

New Colliery Workings in Lancashire.—At a meeting at Worsley, the seat of the Earl of Ellesmere, last Thursday, it was stated that colliery owners were preparing new mines in Lancashire, to make up for old ones becoming exhausted, which would involve an outlay of £2,000,000. Lord Ellesmere is sinking a new pit at Wharton Hall, to tap the Arley seam; the Clifton and Kearsley Coal Company are opening a new pit at Kearsley Moss; Messrs. S. Roscoe and Sons are tapping an extensive seam of Arley coal from their Peel Hall Collieries; and the Little Hulton Colliery Company are opening a new mine between Atherton and Chequerbent.

Lighting the New Vauxhall Bridge Approach.—A letter from the London County Council, asking to be informed of the wishes of Lambeth Borough Council as to the lighting of the new Vauxhall Bridge approach, was before the latter body at their last meeting. A suggestion in favour of electricity not having found any supporters, it was resolved to request the County Council to follow the rule laid down with regard to the main roads in the borough—viz., that the lamps should be placed at intervals of not more than 30 yards, and that they comprise Eddystone columns, South London lanterns, and No. 4 incandescent burners. If this is agreed to, the Borough Council will bear the cost of the lighting and maintenance of the lamps as soon as they are erected.

New Joint-Stock Companies.—The Gas and Water Works Supplies and Construction Company, Limited, has been registered with a capital of £10,000 in £1 shares (£6000 of 10 per cent. preference), to adopt an agreement with the Gas-Works Supply and Construction Company, and to carry on the business of contractors, engineers, constructors of gas and water works and plant, suppliers of gas and water, &c. The Air Light Company, Limited, has been registered with a capital of £10,000, in £1 shares, to carry on the business of lighting engineers, manufacturers of, and dealers in, apparatus for lighting and heating by gas or other means, manufacturers and suppliers of incandescent lights and mantles, and accessories for the same, makers of meters, fans, lamps, and other appliances, &c., and to adopt an agreement with the Scott-Snell-Phillips Syndicate, Limited. There will be no initial public issue.

Nantwich Water Supply.—Mr. Baldwin Latham, who is advising the Nantwich Urban District Council on the question of water supply, has submitted his report on the existing works and means for augmenting them. He states that under no circumstances would less than 160,000 gallons a day, or 20 gallons per head, be sufficient for the present population; and in order to make suitable provision for the future, a supply of 200,000 gallons a day ought to be secured. This, with a constant supply, would need a storage capacity equal to 36 million gallons. Instead of carrying out any additional works on the present site, he recommends the adoption of another source. Seeing that the price asked by Liverpool for a supply from their mains is prohibitive, he suggests that if the Council go to the new red sandstone rocks to the east of the town they will be likely to secure a sufficient quantity of water of an unimpeachable character, requiring no filtration. In this way, great expense will be saved.

Gas Supply at the Antipodes.—At the 43rd annual meeting of the South Australian Gas Company, on the 25th ult., the Directors reported that the receipts for gas, residuals, &c., for the year ended the 30th of June, showed a slight advance on those for the preceding twelve months. The balance carried to the profit and loss account was £30,767; and after paying the customary dividends and writing off £1800 for depreciation of plant, there was a sum of £22,825 to be carried forward. The prepayment meter system is being extended; 720 meters having been fixed in South Australia, and their introduction into North Adelaide being in contemplation. The North Shore (Sydney) Gas Company made a net profit, after allowing for reserve and depreciation, of £4366 in the six months ended June 30. Adding the balance brought forward (£58), there was a sum of £4424 available for distribution at the half-yearly meeting on the 5th ult. A dividend of 3½ per cent. was declared, free of income-tax, which absorbed £4408, and left £16 to be carried forward.

Fraudulent Consumption of Gas.—At the Swansea Police Court, last Tuesday, John White, a baker, was charged with "connecting a pipe without the consent of the Gas Company." Defendant had been one of the Company's customers, but, getting into arrear with his payments, his gas was cut off in April last year; the service-pipe being plugged and left in position. Consequent upon information which reached the Company, Mr. F. Andrews, the Outdoor Superintendent, went to the defendant's bakehouse on the 7th inst., and found him there with a boy. He saw a plate, with some cakes upon it, heated by 59 burners, supplied with gas by an india-rubber tube, connecting the inlet and outlet pipes. Mr. Andrews told defendant he had been guilty of a serious offence; and he at once gave orders for the pipe to be disconnected. Defendant admitted using the gas for an hour daily for 21 days, and said he had repeatedly asked to have a meter. This, however, had been refused pending the settlement of the outstanding account. Mr. Andrews, in giving evidence, said it was absurd to suppose the defendant had used the gas for only one hour a day, as it would take this time to warm the plate. If the stove was in proper working order, about 150 cubic feet of gas would be consumed every hour. Defendant pleaded guilty. The Magistrates came to the conclusion that the offence could not have been committed in ignorance; and they imposed a fine of £5, and 5s. a day for the 21 days the pipe was acknowledged by the defendant to have been connected—making £10 5s. in all.

PARKINSON'S

GAS-FIRES.

The "SAPPHIRE."

Elegant in Design.

Burner removable without disconnecting Fire.

Latest Improvements.

Most substantially made.

Suitable for Hiring out.

PARKINSON AND W. & B. COWAN, LTD.
(PARKINSON BRANCH),
LONDON AND BIRMINGHAM.

Sulphur in Coal.—In the "Journal of the American Chemical Society," Mr. E. E. Somermeier gives the results of further studies on the forms in which sulphur occurs in coal. He finds that when the sulphur is present in the form of ferrous sulphate, the results given by Dulong's formula will be 10 calories too low for each 1 per cent. present in that form. In the case of sulphur as pyrites, the results based on uncorrected ultimate analyses are about 9·6 calories too high for each 1 per cent. of sulphur in that form; while if corrections be made for the amount of oxygen in the ash, the calculated results will be 6·6 calories too low. From the averages obtained with five samples of coal, the general conclusion arrived at is that very satisfactory results for total sulphur are given by Dulong's formula (unmodified) applied to the figures of an uncorrected ultimate analysis. The formula gives lower results than those obtained by the use of Mahler's calorimeter, especially in the case of samples highest in moisture and oxygen.

Incandescent Gas Lighting on the Continent.—The accounts which have been issued by the various European Welsbach Companies for the year 1903-4 show that the German concern is the only one which has made any progress, and the development of this undertaking—the German Incandescent Gas-Light Company of Berlin—is a pleasant surprise when contrasted with the gradual decline from the remarkably prosperous condition of several years ago. It is proposed to pay a dividend at the rate of 12 per cent., compared with 9 per cent. in the preceding year; the profits having amounted to £20,454, against £15,386. The improvement is attributed to an increase in the volume of business. The Directors state that, as the result of changes made in the organization of the Austrian Incandescent Gas-Light Company, alterations have been made in the agreement existing between that Company and the German Company. The modified arrangement has taken the form of the transfer, under licence, to the German Company, in addition to Germany, Holland, and Luxembourg, as at present, of the exclusive patents rights of the osmium lamp for England, and the British colonies, Belgium, South America, and Asia. The Austrian Incandescent Gas-Light Company have not yet issued their report for 1903-4. An announcement has, however, been made of the intention of the Directors to propose the payment of a dividend at the rate of 25 per cent. This compares with a distribution of 30 per cent. a year ago, and shows that the Company are following the example set some time since by the German concern. In the case of the Swiss Incandescent Gaslight Company, of Zurich, the balance of profits is practically the same as in 1902-3; and the dividend remains at 6 per cent. The French Company, who have written off entirely the sum of £40,000 paid for the patent rights of the osmium lamp for France, have declared a dividend of £1 per share; while the profits of the Italian Company are to be devoted to the erection of a new factory.

An interim dividend at the rate of 6 per cent. per annum has been declared by the Directors of the San Paulo Gas Company, Limited.

The Swindon United Gas Company have placed an order with Messrs. Robert Dempster and Sons, Limited, of Elland, for regenerator settings on Waddell's patent system.

The Directors of the Monte Video Water-Works Company, Limited, have declared an interim dividend at the rate of 5 per cent. per annum, free of tax, for the half year ending June 30.

The carrying capacities of aqueducts are seriously reduced by slime and other growths on the interior surfaces. The Engineers of the Commission on Additional Water Supply for New York City, in their preliminary studies, allowed 12½ per cent. for this diminution—basing their estimate on measurements of flow in existing aqueducts. The capacity of the Sudbury aqueduct has at times been reduced as much as 13½ per cent.; that of the Cochituate acqueduct, 11¾ per cent.; and that of the Wachusett aqueduct, from 10 to 11 per cent.

The Chemical Engineering Company, and Wilton's Patent Furnace Company, have received an order for the supply of a complete liquid and anhydrous ammonia plant for the Christchurch (New Zealand) Gas Company, Limited; and their plans for this plant have been accepted by the New Haven Gas Company of Connecticut (U.S.A.). The Company have also been favoured with an order from the Barnsley Main Colliery Company, Limited, for the supply and erection of one of their patent ammoniacal liquor stills and closed round saturators.

We have received from the Rust Boiler Company, of Pittsburgh, an illustrated pamphlet descriptive of their water-tube boiler, which was first introduced at the Minnequa Steel-Works of the Colorado Fuel and Iron Company, at Pueblo (Col.). It was designed and patented by Mr. E. G. Rust, the Company's former Chief Engineer and General Superintendent; and it is claimed for it that it embodies the best features of the more successful of the old types of boilers, while their defects have been eliminated. This claim, the Company maintain, is justified by the working of the boiler during a number of years.

The sand filter system of Cheyenne, Wyo., was considerably damaged last May by a flood, and practically complete reconstruction has been necessary. The sand bed is placed directly on the bottom of the creek furnishing the supply; the water passing through it being collected in box-drains with stave manholes. When the flood came down the creek, it brought with it the wreckage of about 250 feet of railway line, which was lodged on top of the sand bed and damaged it seriously. The "Engineering Record" says the incident shows the desirability of placing filters above the flood level, even at much greater first cost of construction.

The "Engineering Record" says another East River tunnel at New York seems probable; but it will be for gas-mains (like the only tunnel now under the river), and not for passengers. It is understood that the project contemplates a tunnel from Lawrence Point, Astoria, to East 110th Street, Manhattan. A Commission to condemn city and State property for the purpose was appointed a few weeks ago. The property of the Consolidated Gas Company in Manhattan is very valuable; and it has been recognized generally for some time that sooner or later high taxes and other causes would compel the Company to give up their works in the borough, and pipe gas through tunnels from huge plants on Long Island.

GAS FIRE SEASON.

1904-5.

Artistic Designs.

Original Improvements.

New Sizes.

RICHMOND'S LTD.

LONDON OFFICE: 132, QUEEN VICTORIA STREET, E.C.

WORKS: { WARRINGTON, STRATFORD.

Messrs. George Glover and Co., Limited, have in hand at present, at their Chelsea works, four 1000-light dry meters, which are being made to the order of one Company. This is believed to be the largest order for dry meters of this size ever received by any firm of meter makers.

The Richmond Gas Stove and Meter Company, Limited, have recently secured a contract for three years with the Fordingbridge Gas Company, Limited, for the supply of gas cookers and meters, and the fitting-up of houses with complete automatic installations. We learn that considerable business has already been done.

WANTED, FOR SALE, CONTRACT, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Situations Vacant.

MANAGER. New Mills Gas Department. Applications by September 28.
OUTSIDE SUPERINTENDENT. Canterbury Gas and Water Company.
FOREMAN COKE-OVEN WORKS. Priestman Collieries, Newcastle-on-Tyne.
GAS-FITTERS. Birmingham Gas Department.
JUNIOR CLERK. High Wycombe Gas Company.

Situations Wanted.

CLERK. No. 4266.
COMMERCIAL MANAGER. "Routine," c/o Horncastle's, London, E.C.

Works to Lease. No. 4269.

Plant, &c., for Sale.

ARTESIAN WELL TOOLS. Newport (Isle of Wight) Gas-Works.
BOOKS (VARIOUS). No. 4268.
STEEL GAS MAIN. Rotherham Corporation.

Plant Wanted.

EXHAUSTER. Nichols Chemical Company, Baxenden.

Stocks and Shares.

WITNEY GAS AND COKE COMPANY.

Company Meeting.

BRITISH GASLIGHT COMPANY. London Offices, September 28, at Twelve o'clock.

TENDERS FOR

Breeze.

SWANSEA GASLIGHT COMPANY.

Coke.

RAMSGATE GAS DEPARTMENT. Tenders by October 8.

Tar and Ammoniacal Liquor, &c.

BRIDGWATER COLLIERIES COKE-WORKS. Tenders by September 26.
GAINSBOROUGH URBAN DISTRICT COUNCIL. Tenders by September 28.
NORTHWICH GAS COMPANY. Tenders by October 7.
WINSFORD GAS DEPARTMENT. Tenders by October 4.

GAS COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 800.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
570,000	10	Apl. 14	10½	Alliance & Dublin 10 p.c.	20—21	..	5 0 0
100,000	10	,,	7½	Do. 7 p.c.	13¼—14½	..	5 3 5
220,000	5	May 12	6½	Bombay, Ltd.	6½—6¾	..	4 16 4
140,000	5	,,	6½	Do. New, £4 paid	4¾—5¼	..	4 18 11
50,000	10	Aug. 31	14	Bourne-mouth Gas and Water 10 p.c. B 7 p.c. Pref. 6 p.c.	28—29	..	4 16 7
251,810	10	,,	7		14¾—15½	..	4 10 4
53,200	10	,,	6		14—15	..	4 0 0
380,000	Stk.	Aug. 12	12	Brentford Consolidated	235—240	..	5 0 0
300,000	,,	,,	9	Do. New	177—182	..	4 18 10
50,000	,,	,,	5	Do. 5 p.c. Pref.	125—130	..	3 16 11
206,250	,,	June 10	4	Do. 4 p.c. Deb.	102—105	..	3 16 2
220,000	Stk.	Sept. 15	11	Brighton & Hove Orig.	207—212*	..	5 3 9
246,320	,,	,,	8	Do. A. Ord. Stk.	146—151*	..	5 6 0
460,000	20	Apl. 14	10	British	39½—40½	+½	4 18 2
100,000	Stk.	Aug. 12	6	Bromley, Ord. 5 p.c.	114—118	..	5 1 9
165,700	,,	,,	4½	Do. do. 3½ p.c.	88—93	..	4 16 9
500,000	10	May 12	7	Buenos Ayres (New) Ltd.	11—11½	..	6 1 9
250,000	Stk.	June 29	4	Do. 4 p.c. Deb.	92—94	..	4 5 1
150,000	20	July 14	8½	Cagliari, Ltd.	21—23	..	7 3 6
100,000	10	May 27	10	Cape Town & Dis., Ltd.	14—15	..	6 13 4
100,000	10	Apl. 28	4½	Do. 4½ p c Pref.	92—93½	..	4 12 4
50,000	50	May 3	6	Do. 6 p.c. 1st Mort.	51—53	..	5 13 2
50,000	Stk.	June 29	4½	Do. 4½ p.c. Deb. Stk	98—100	..	4 10 0
1,375,000	Stk.	Aug. 31	5⅝	Commercial 4 p.c Stk.	108—112	..	4 12 10
560,000	,,	,,	5	Do. 3½ p.c. do.	104—107	..	4 13 6
450,000	,,	June 10	3	Do. 3 p.c. Deb. Stk.	84—86	..	4 10 11
800,000	Stk.	June 10	6	Continental Union, Ltd.	102—107	..	5 12 2
200,000	,,	,,	7	Do. 7 p.c. Pref.	135—140	..	5 0 0
486,090	10	July 14	11	European, Ltd.	19½—20½	+½	5 7 4
354,060	10	,,	11	Do. £7 10s. paid	13½—14½	+½	5 13 9
15,243,200	Stk.	Aug. 12	4⅛	Gas-light and Coke 4 p.c. Ord.	93—95	+1	4 12 6
2,600,000	,,	,,	3½		86—88	..	3 19 7
3,799,735	,,	,,	4		107—110	..	3 12 9
4,193,975	,,	June 29	3		87—89	..	3 7 5
258,740	Stk.	Sept. 15	5	Hastings & St. L. 3½ p.c.	90—95*	..	5 5 3
70,000	10	Apl. 28	11	Hongkong & China, Ltd.	15—16	..	6 17 6
3,800,000	Stk.	May 12	10	Imperial Continental	200—205	..	4 17 7
473,600	Stk.	Aug. 12	3½	Do. 3½ p.c. Deb Red.	95—98	..	3 11 4
175,036	Stk.	Aug. 31	6	Lea Bridge Ord. 5 p.c.	112—117	..	5 2 7
561,000	Stk.	Aug. 31	10	Liverpool United A	217—219	..	4 11 4
718,100	,,	,,	7	Do. do. B	158½—160½	..	4 7 3
306,083	,,	June 29	4	Do. do. Deb. Stk.	105—108	..	3 14 1
75,000	5	June 29	5	Malta & Medn., Ltd.	4¼—4⅜	..	5 5 3
560,000	100	Apl. 5	5	Met. of 5 p.c. Deb.	102—105	..	4 15 3
250,000	100	,,	4½	Melbourne 4½ p.c. Deb.	100—102	..	4 8 3
541,923	20	May 27	3½	Monte Video, Ltd.	10—11	+⅛	6 7 3
1,515,892	Stk.	July 29	4½	Newc'tle & G'tesh'd Con.	104½—105	..	4 5 9
466,425	Stk.	July 1	3½	Do. 3½ p.c. Deb.	92—92½	..	3 15 8
15,000	10	Aug. 31	10	North Middlesex 10 p.c.	19—20	..	5 0 0
52,940	11	,,	7	Do. 7 p.c.	13—14	..	5 0 0
300,000	Stk.	May 12	8	Oriental, Ltd.	140—145	..	5 10 4
600,000	5	Sept. 15	7	Ottoman, Ltd.	5½—6½*	..	5 12 0
235,005	Stk.	—	6½	Plym'th & St'house 5 p.c.	—	..	—
398,490	5	Apl. 28	10	Primitiva Ord.	4—4½	..	11 2 2
796,982	5	July 28	5	Do. 5 p.c. Pref.	4—4½	..	5 11 1
492,400	10	June 1	4	Do. 4 p.c. Deb.	92—94	..	4 5 1
851,070	10	Apl. 28	7	River Plate Ord.	11—11½	..	6 1 9
300,000	Stk.	June 29	4	Do. 4 p.c. Deb.	93—95	..	4 4 3
250,000	10	Sept. 15	6	San Paulo, Ltd.	11—12*	..	5 0 0
70,000	50	June 29	5	Do. 5 p.c. Deb.	49—51	..	4 18 0
135,000	Stk.	Mar. 10	10	Sheffield A	237—239	..	4 3 8
209,984	,,	,,	10	Do. B	236—238	..	4 4 0
523,498	,,	,,	10	Do. C	234—236	..	4 4 9
123,998	Stk.	—	5	Shrewsbury Ord. 5 p.c.	—	..	—
70,000	10	May 27	11	South African	15—16	..	6 17 6
6,250,000	Stk.	Aug. 12	5½	South Met., 4 p.c. Ord.	124—126	..	4 7 3
1,832,700	,,	July 14	3	Do. 3 p.c. Deb.	87—89	..	3 7 5
575,000	Stk.	Aug. 31	5½	S'th Suburb'n Ord. 5 p.c.	115—120	..	4 11 8
60,000	,,	,,	5	Do. 5 p.c. Pref.	118—123	..	4 1 4
112,533	,,	July 14	5	Do. 5 p.c. Deb. Stk.	133—138	..	3 12 6
380,940	Stk.	May 12	5	Southampton Ord.	105—110	..	4 10 11
87,950	,,	—	4	Do. 4 p.c. Deb.	—	..	—
120,000	Stk.	Aug. 31	6¾	Tottenham and Edmonton A 5 p.c.	118—123	..	5 1 8
325,520	,,	,,	4¾	B 3½ p.c.	95—100	..	4 15 0
182,380	10	June 10	8	Tuscan, Ltd.	8⅛—8¾	..	9 2 10
149,900	10	July 1	5	Do. 5 p.c. Deb. Red.	96—98	..	5 2 0
30,000	Stk.	Aug. 31	7¾	Wandsworth A 5 p.c.	150—155	+2	5 0 0
255,636	,,	,,	6¾	B 3½ p.c.	120—125	+2	5 0 0
50,000	,,	,,	5 17/20	and C 3⅜ p.c.	102—107	+2	4 18 2
59,416	,,	June 29	3	Putney 3 p.c. Deb. Stk.	78—83	..	5 12 8
745,872	,,	Aug. 12	5	West Ham 5 p.c. Ord.	95—100	..	5 0 4
85,000	,,	,,	5	Do. 5 p.c. Pref.	115—120	..	4 3 4
160,000	,,	June 29	4	Do. 4 p.c. Deb. Stk.	103—108	..	3 14 1

Prices marked * are Ex div.

OXIDE OF IRON.

O'NEILL'S OXIDE has a larger annual sale than all other Oxides combined.

SPENT OXIDE purchased in any district.

GAS PURIFICATION & CHEMICAL CO., LD.

JOHN WM. O'NEILL, Managing Director,

PALMERSTON HOUSE, LONDON, E.C.

WINKELMANN'S

"VOLCANIC" FIRE CEMENT.

Resists 4500° Fahr. Best for GAS-WORKS.

ANDREW STEPHENSON, 182, Palmerston House, Old Broad Street, London E.C. "Volcanism, London."

SULPHURIC ACID for Sale, specially suitable for making Sulphate of Ammonia.

BROTHERTON AND CO., LTD., Chemical Manufacturers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM, and 45 & 47, Westminster Bridge Road, LONDON, S.E.

WET AND DRY GAS-METERS, PREPAYMENT METERS, STATION METERS, AND GOVERNORS.

REPAIRS RECEIVE PROMPT ATTENTION.

Telephones: 25 Oldham, and 2412 HOP, London.

Telegrams:—

"BRADDOCK, OLDHAM," and "METRIQUE, LONDON."

DUTCH OXIDE OF IRON.

THE First Dutch Bog Ore Co., Ltd., (Eerste Hollandsche Yzererts Maaty), ROTTERDAM.

General Manager (for England and Wales)—

CHARLES E. FRY, LEAMINGTON; and at Tower Chambers, Brown Street, MANCHESTER.

London Managers—

E. PADFIELD & CO., 96-98, Leadenhall Street, LONDON, E.C.

General Manager (for Scotland)—

J. B. MACDERMOTT, 11, Bothwell St., GLASGOW.

OXIDE OF IRON.

(NATURAL.)

BALE & CHURCH will be pleased to send Samples and Quotations, and make Offers for SPENT OXIDE.

BALE'S FIRE CEMENT, PAINT, AND GAS COAL

5, CROOKED LANE, LONDON, E.C.

SULPHURIC ACID.

SPECIALLY prepared for the Manufacture of SULPHATE OF AMMONIA.

SPENCER, CHAPMAN, AND MESSEL, LIMITED, 36, Mark Lane, LONDON, E.C. Works: SILVERTOWN.

Telegrams: "HYDROCHLORIC, LONDON."

Telephone: 341 AVENUE.

COAL GAS TAR wanted.

ROBINSON BROTHERS, LIMITED. Works: WEST BROMWICH, KNOTTINGLEY, and SPONDON.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or stoppages of, PERMANENT ADVERTISEMENTS should be received by the FIRST POST on SATURDAY.

Wanted, For Sale, and Tender Advertisements, Six Lines and under, 3s.; each additional Line, 6d.

TERMS OF SUBSCRIPTION to the "JOURNAL."
United Kingdom: One Year, 21s.; Half Year, 10s. 6d.; Quarter, 6s. 6d.
Payable in Advance. If credit is taken, the charge is 25s. a year.
Abroad (in the Postal Union): £1 7s. 6d., payable in Advance.

All Communications, Remittances, &c., to be addressed to WALTER KING, 11, BOLT COURT, FLEET STREET, LONDON, E.C.
Telegrams: "GASKING, LONDON." Telephone: P.O. 1571a Central.

ROBERT DEMPSTER & SONS, Ltd., Contractors for Complete CARBONIZING PLANTS and every description of GAS APPARATUS and ELEVATING and CONVEYING PLANT, ROSE MOUNT IRON-WORKS, ELLAND.

BROTHERTON & CO., LIMITED. Offices: Commercial Buildings, LEEDS. Correspondence invited.

HYDRATED OXIDE OF IRON.
PREPARED from Pure Iron.
Twice as Rich as Bog Ore.
Gives no Back Pressure.
The Cheapest in the Market.
Can be Lent on Hire.
Can be Exchanged for Spent Oxide.
READ HOLLIDAY AND SONS, LTD., HUDDERSFIELD.

TO GAS AND WATER OFFICIALS.
MELROSE CYCLES and Slot Copper COLLECTORS. Latest Design and lowest Prices. For Cash or gradual payments. Catalogue free.
MELROSE CYCLE COMPANY, COVENTRY.

COAL GAS TAR wanted.
BEST PRICES GIVEN.
SHARPNESS CHEMICAL COMPANY, LIMITED, Sharpness Docks, GLOS.

SPECIAL PAINT FOR GAS-WORKS.
JOHN E. WILLIAMS AND CO.,
VICTORIA PAINT WORKS,
MANCHESTER.
Telegrams: "ENAMEL." National Telephone 1759.

JOHN RILEY & SONS, Chemical Manufacturers, Hapton, near Accrington, are MAKERS of Special SULPHURIC ACID, for Sulphate of Ammonia Making. Highest percentage of Sulphate of Ammonia obtained from the use of this Vitriol, which has now been used for upwards of 50 Years. References given to Gas Companies.

ATTERTON'S Patent Charging Machine, especially adapted for Small Works up to 50 Millions. Nearly 40 already supplied, and still supplying. Would soon repay for small outlay. Increased make and reduction in cost.
Apply to E. PADFIELD AND CO., 96 & 98, Leadenhall Street, LONDON, E.C.

PENNY-IN-THE-SLOT WORK.
H. GREENE & SONS, Ltd., are prepared to give QUOTATIONS to Gas Companies or Corporations for FITTING UP COMPLETE and CARRYING OUT the WORK in its entirety, either in Iron or Compo.
SURREY ENGINEERING WORKS, BLACKFRIARS ROAD, LONDON, S.E.
Telephone: 1693 HOP. Telegrams: "LUMINOSITY."

SPENT OXIDE.
THE South Metropolitan Gas Company are always open to receive OFFERS of SPENT OXIDE.
Chief Office: 709, Old Kent Road, London, S.E.
Telegrams: "METROGAS, LONDON."

GAS TAR wanted.
BROTHERTON AND CO., LTD., Tar Distillers.
Works: BIRMINGHAM, GLASGOW, LEEDS, LIVERPOOL, AND WAKEFIELD.

PATENTS AND TRADE MARKS PUBLICATIONS. "MERCHANDISE MARKS ACT, and Decisions thereunder," 1s.; "TRADE SECRETS v. PATENTS," 6d.; "DOCTRINE of EQUIVALENTS, Mechanical and Chemical," 6d.; SUBJECT-MATTER of PATENTS," 6d.
MEWBURN, ELLIS, & PRYOR, Chartered Patent Agents, 70 and 72, Chancery Lane, London, W.C. Telegrams: "Patent London." Telephone: No. 243 Holborn.

AMMONIACAL LIQUOR wanted.
BROTHERTON AND CO., LTD., Ammonia Distillers.
Works: BIRMINGHAM, GLASGOW, LEEDS, LIVERPOOL, AND WAKEFIELD.

SULPHATE OF AMMONIA SATURATORS and LEAD WORK for Sulphate of Ammonia Plants.
For REPAIRS or ALTERATIONS ring up "0848 BOLTON," or Telegraph "SATURATORS, BOLTON."
Largest Practice and most Up-to-Date Works in Britain.
JOSEPH TAYLOR AND CO., CENTRAL PLUMBING WORKS, BOLTON.

ROYAL MASONIC INSTITUTION for GIRLS

OCTOBER ELECTION, 1904.

TO THE GOVERNORS AND SUBSCRIBERS—

The favour of your Votes and interest is earnestly solicited on behalf of

VIOLET ISABEL HUNTER, Aged 8 Years.

Her father, Bro. ROBERT HUNTER, was initiated in the "Journeyman" Lodge, No. 8 Edinburgh, Jan. 31, 1867. He joined the "Royal Edward" Lodge, No. 1088, Jan. 1876, and continued a Subscribing Member until his death. He also joined the "Evening Star" Lodge, No. 1719, in 1877, and was a Subscribing Member for many years.

Bro. ROBERT HUNTER died from Bright's Disease, in October, 1898, leaving a widow and eight children unprovided for.

This most deserving case is strongly recommended by the W.M. and Brethren of the "Evening Star" Lodge; and Votes on behalf of this Case for any of the Masonic Charities, or assistance in any other direction, will be much esteemed.

W. D. CHILD, P.M., Secretary,
"Evening Star" Lodge, No. 1719.

Gas-Works, Romford,
September, 1904.

THE Gas and Water-Works Supplies and Construction Company undertake all Gas and Water Work, Main Laying, &c. Gas and Water Works Financed and Loans Granted. Shares and Stock accepted in part payment for Work and Materials supplied. Gas-Works purchased outright.
Address, 99, CANNON STREET, LONDON, E.C.

CLERK (22) requires situation. Upwards of Six Years Experience in Accountant's and Gas Company's Secretary's Office. Competent Book-Keeper. Shorthand and Typewriting. Quick and Accurate. Best References.
Address No. 4266, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

ADVERTISER, 31, Married, having held influential positions as Commercial Manager to large works in England, France, and Germany, excellent Linguist, strict Disciplinarian, experienced Accountant, and Organizer, desires permanent position in England, now or later. Highest References. Period of trial accepted. Address "ROUTINE," care of Horncastle's, CHEAPSIDE, E.C.

WANTED, a Junior Clerk for Gas Office. Wages £1 per week.
Apply, by letter, stating Age, &c., to the SECRETARY, Gas-Works, HIGH WYCOMBE.

CANTERBURY GAS AND WATER COMPANY.
OUTSIDE Superintendent wanted, with Experience in both Gas and Water Distribution.
Applications, stating Qualifications and Salary required, with Testimonials, to
H. C. PAGE,
Engineer.

THE New Mills Urban District Council invite APPLICATIONS for the appointment of GAS MANAGER. Salary £130 a Year.
Candidates must be competent to undertake, and have a thorough knowledge of, the duties appertaining to the office.
Applications, in candidates own hand-writing, stating present and previous Employment, Age, and whether in a position to commence duties at once, accompanied by not more than Three Testimonials of recent date, to be sent to me not later than Four o'clock Wednesday, Sept. 28, 1904.
JOSEPH POLLITT,
Clerk.
Town Hall, New Mills, Sept. 14, 1904.

CITY OF BIRMINGHAM.
(GAS DEPARTMENT.)

GAS-FITTERS WANTED.

APPLICANTS, under 35 Years of age, must be fully Qualified, used to Fixing Wet Meters, and accustomed to all classes of Compo. and Iron Pipe Work, Stoves, and Chandelier Fitting. Sample Meter Joints must be made by Applicants prior to engagement. Permanent employment for suitable men. Wages 8½d. per hour.
Apply, with *copies* of Two recent Testimonials, to GAS FITTINGS DEPARTMENT, Council House, BIRMINGHAM.

TAR Contracts Wanted on the Sliding-Scale or at Fixed Prices.
Managers and Secretaries desirous of selling to best advantage, please communicate with DENT AND CO., Ouse Chemical Works, SELBY.

WANTED, Competent, Energetic, and Experienced FOREMAN, to take Complete Charge of the Burning and Working of a battery of Otto Coke-Ovens.
Apply, by letter, stating previous Experience and Salary required, with Testimonials, to the PRIESTMAN COLLIERIES, LIMITED, 2, Princes Buildings, NEWCASTLE-ON-TYNE.

WORKING Gas Managers (or others) desirous of taking Small Gas-Works on Lease, should send full Particulars, Ability, &c., to No. 4269, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a small Beales' Exhauster or other Machine for same purpose, in good condition.
Address, with full Particulars and Price, NICHOLS CHEMICAL CO., LTD., Baxenden, LANCASHIRE.

NEW "Cripps" Washer, 8-inch Bye-Pass, in Stock. Will sell cheap.
FIRTH BLAKELEY & CO., Gas Engineers, DEWSBURY.

FOR SALE—a complete set of Artesian Well Tools, suitable for 500 foot bore. Details on application. Any reasonable offer accepted.
Apply to H. J. IBBOTSON, Gas-Works, Newport, ISLE OF WIGHT.

CREOSOTE Oil, either Liquid or Salty, to be had in any quantity, either in Tank-Waggons or in Casks for shipment.
Apply, by letter, to No. 4267, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

"DEMPSTER'S" Direct-Acting Reciprocating Pumps, Exhausters, and Steam-Engine Combined. Two Sets, 8-inch and 12-inch Connections. Overhauled and Guaranteed. Cheap. Room wanted.
FIRTH BLAKELEY & CO., Gas Engineers, DEWSBURY.

BOOKS FOR SALE.
NEWBIGGING'S Handbook and other Books on Gas Manufacture FOR SALE, Cheap and in Good Condition.
Address No. 4268, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

TO BRICK AND CEMENT MAKERS AND OTHERS.
THE Swansea Gaslight Company have for sale good ordinary COKE BREEZE, for Shipment or on Rail.
Apply MANAGER, Gas-Works, SWANSEA.

FIVE Million Gallons Coal-Gas Tar wanted per Year. Offerings in large or small quantities—at fixed price—for period of from One to Five Years requested.
Address: EDWARD RONEY, C.E., 9, Queen's Road, Bootle, LIVERPOOL.

COUNTY BOROUGH OF ROTHERHAM.
(GAS DEPARTMENT.)

FOR SALE, about 120 yards of 20-inch STEEL GAS-MAIN. Splendid condition. Inspection invited.
FRANK A. WINSTANLEY,
Engineer and Manager.

GAS PLANT for Sale—I can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.
J. F. BLAKELEY, Gas Engineer, Thornhill, DEWSBURY.

GASHOLDER, 40 ft. diameter by 14 ft. deep, in wrought Tank, with six Columns, trellis Girders, and Suspension Gear. In splendid condition. Nearly new.
New GASHOLDER, 40 ft. diameter by 12 ft. deep, with Steel Standards; also new STEEL TANK to contain same.
Write J. WRIGHT, 181, Queen Victoria Street LONDON, E.C.

RAMSGATE CORPORATION.
(GAS AND WATER DEPARTMENT.)

THE Committee invite Tenders for the purchase of their surplus COKE from Oct. 1, 1904, to Sept. 30, 1905. Probable quantity, 2000 to 3000 Tons. Delivered free on rail or free into barge, Ramsgate, purchaser paying dues.

Tenders to be sent in not later than Noon on Saturday, Oct. 8, 1904, addressed to the Chairman of the Gas and Water Committee, Boundary Road, Ramsgate, and endorsed "Tender for Coke."

The Committee do not bind themselves to accept the highest or any Tender.

T. N. RITSON,
Engineer and Manager.

Gas and Water Offices,
Boundary Road, Ramsgate.

NORTHWICH GAS COMPANY.

THE Directors of the Northwich Gas Company invite TENDERS for the surplus TAR produced at these Works during the Year ending Sept. 30, 1905.

Coal Carbonized, about 6000 Tons.

Any further Particulars requested can be had on application to the undersigned.

Tenders, endorsed "Tar" and addressed to the Chairman, must be delivered here not later than Ten a.m. on Friday, Oct. 7, 1904.

SAML. S. MELLOR,
Manager and Secretary.

Gas-Works, Northwich,
Sept. 16, 1904.

WINSFORD URBAN DISTRICT COUNCIL.
(GAS DEPARTMENT.)

THE above Council is prepared to receive TENDERS for the purchase of the surplus TAR and AMMONIACAL LIQUOR made at their Gas-Works for a term of One Year from the 16th day of October, 1904.

Full Particulars and Form of Tender may be obtained on application to Mr. F. Sidwell, Manager, Gas-Works, Winsford.

Tenders, marked "Surplus Tar," to be sent to the undersigned on or before the 4th day of October, 1904.

JNO. H. COOKE,
Clerk to the Council.

Council Offices, Russell Street,
Winsford, Cheshire, Sept. 15, 1904.

BRIDGEWATER COLLIERIES COKE-WORKS.
(THE EARL OF ELLESMERE).

TENDERS are invited for the Light Oil produced at the above Works for a period of Six or Twelve Months from the 1st of November, 1904, delivered into Contractor's Tanks at the Bridgewater Colliery Siding, Wharton Hall, on the Pendleton and Hindley Branch of the Lancs. and Yorks. Railway; or at the Brackley Siding on the Little Hulton Mineral Branch of the L. and N. W. Railway.

Tenders, endorsed "Tender for Light Oil," to be addressed to Mr. Thomas M. Brown, Bridgewater Coal Office, 4, Chapel Walks, Manchester, on or before the 26th inst.

Manchester, Sept. 8, 1904.

GAINSBOROUGH URBAN DISTRICT COUNCIL.
(GAS DEPARTMENT.)

TENDERS FOR TAR.

THE Gas Committee of the above Council are prepared to receive TENDERS for the purchase of the surplus TAR produced at their Gas-Works for a period of Twelve Months from Oct. 1, 1904.

Probable quantity, 450 Tons.

Further Particulars may be obtained on application to the undersigned.

Sealed and endorsed Tenders, addressed to the Chairman of the Gas Committee, must be delivered at the Gas-Works not later than Sept. 28, 1904.

The Committee do not bind themselves to accept the highest or any Tender.

JOHN BALDWIN,
Manager.

Gas-Works, Gainsborough,
Sept. 8, 1904.

BRITISH GASLIGHT COMPANY, LIMITED.

NOTICE is Hereby Given, that the HALF-YEARLY ORDINARY GENERAL MEETING of the Proprietors of this Company will be held at this Office on Wednesday, the 28th inst., at Twelve o'clock precisely, to transact the usual Business, to declare a Dividend for the Half Year ended the 30th of June last, to elect Two Directors in the place of those who go out by rotation, and to appoint Two Auditors.

Notice is Hereby also Given, that the TRANSFER BOOKS of the Company WILL BE CLOSED on the 17th and RE-OPENED on the 29th inst.

By order of the Court of Directors,
H. B. CHAMBERLAIN,
Secretary.

Chief Office: No. 11, George Yard,
Lombard Street, London, E.C.,
Sept. 7, 1904.

ISSUES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MR. ALFRED RICHARDS begs to notify that his ISSUES by AUCTION under PARLIAMENTARY POWERS of STOCKS and SHARES in LONDON, SUBURBAN, and PROVINCIAL GAS and WATER COMPANIES take place PERIODICALLY at the Mart, TOKENHOUSE YARD, E.C.

Terms for Issuing such Capital, and also for including Gas and Water Stocks and Shares belonging to Private Owners in these Periodical Sales, can be obtained on application at MR. ALFRED RICHARDS' OFFICES, 18, FINSBURY CIRCUS, E.C.

FOUR-AND-A-HALF PER CENT. DEBENTURES.

THE Witney Gas and Coke Company have for DISPOSAL TWELVE FOUR-AND-A-HALF PER CENT. £100 DEBENTURES. A Dividend of 5 per cent. is regularly paid on the Shares of the Company.

Tenders for the whole or for any number of the Debentures to be addressed to Mr. ARTHUR L. LEIGH, Managing-Director, Gas-Works, WITNEY.

BOOKS AND LEAFLETS
TO BE OBTAINED OF
WALTER KING,
11, BOLT COURT, FLEET STREET, E.C.

LAW OF LONDON GAS COMPANIES.—By T. J. BARNES. *Price* 6s.

PRECEDENTS IN PRIVATE BILL LEGISLATION AFFECTING GAS AND WATER UNDERTAKINGS, 1891-1901 (the Volume for 1879-1890 is still on Sale).—By E. H. STEVENSON and E. K. BURSTAL, MM.Inst.C.E. *Price* 21s.

MOND GAS SCHEME.—By F. N. KEEN, of the Middle Temple, Barrister-at-Law. *Price* 1s.

LAW RELATING TO GAS AND WATER.—By J. SHIRESS WILL, K.C. Fifth Edition. *Price* 35s.

REESON'S COMPLETE GAS AND WATER ACTS.—By JOSEPH REESON. *Price* 21s.

Other Books supplied (Post Free) at Published Prices.

STEAM, OIL, and WATER.

Any Range of Pressure.

ROBERT MARSHALL,
CANNEL COAL MERCHANT.
97, WELLINGTON STREET, GLASGOW.
Prices and Analysis of all the Scotch Cannels on Application.

Just Published. Crown 8vo, 6s. Cloth.
GAS-WORKS
THEIR
CONSTRUCTION AND ARRANGEMENT
And the Manufacture and Distribution of Coal Gas.
By S. HUGHES, C.E.
Ninth Edition, Revised, with Notices of Recent Improvements.
By HENRY O'CONNOR, A.M.Inst.C.E.,
Author of the "Gas Engineer's Pocket Book."
LONDON: CROSBY LOCKWOOD & SON,
7, STATIONERS' HALL COURT, E.C.

THE
"ROTARY"
STATION METER.
Efficiency Demonstrated.
APPLY—
T. G. MARSH,
MAWSON CHAMBERS, DEANSGATE, MANCHESTER.

GAS FIRES
IMPERIAL STOVE COMPANY.
NEW PATTERNS.
WRITE FOR LISTS.
Season 1904-5.
Telephone ONE X, LEAMINGTON.

RAILS.
New and Second-Hand with all Accessories; also Tip Waggons and Turntables.
B. M. RENTON,
MIDLAND WORKS,
SHEFFIELD.

JAMES OAKES & CO.,
ALFRETON IRON-WORKS, DERBYSHIRE,
AND
Wenlock Iron Wharf, 21 & 22, Wharf Road, CITY ROAD, LONDON, N.,
Manufacture and keep in Stock at their Works (also large stock in London)
PIPES and CONNECTIONS, 1½ to 48 inches in diameter, and make and erect to order RETORTS, PURIFIERS, and TANKS, with or without planed joints, COLUMNS, GIRDERS, SPECIAL CASTINGS, &c., required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.
NOTE.—Makers of HORSLEY'S PATENT SYPHONS. These are cast in one piece, without Chaplets; doing away with Bolts, Nuts, and Covers, and rendering Leakage impossible.

THE SILICA FIRE-BRICK COMPANY,
OUGHTIBRIDGE, near SHEFFIELD.
MANUFACTURE
SILICA BLOCKS, BRICKS, AND CEMENT
OF SUPERIOR QUALITY
FOR GAS-FURNACES.
Trade Mark: "SILICA."
These Goods (largely used in Gas, Glass, Iron, and Steel Works) are, on account of their GREATER DURABILITY, Strongly recommended where EXCESSIVE HEATS have to be maintained.

THOMAS TURTON AND SONS, LIMITED,

SHEAF WORKS, SHEFFIELD,

MANUFACTURERS OF

FILES OF BEST QUALITY FOR ENGINEERS.

STEEL OF ALL DESCRIPTIONS.

SCREW STOCKS, TAPS AND DIES, SPANNERS, RATCHET BRACES, LIFTING JACKS, ANVILS, VICES, AND ENGINEERS' TOOLS GENERALLY,

LONDON OFFICE:

90, CANNON STREET, E.C.

The "BRITON" and "RENNIE" Gas Arc Lamps

(COLBRAN'S PATENT).

VERY STRONG ORNAMENTAL LAMPS.

REGISTERED.

"V" PATTERN "BRITON" LAMP.

JOHN F. COLBRAN,

THE CROWN LAMP WORKS,

58 & 59, CHISWELL ST., E.C.

Telephone: No. 4199 Central.

GREAT SAVING IN FUEL

"A VERY SIMPLE & INGENIOUS APPARATUS."—VIDE "THE ENGINEER" NOV 12TH 1897

SOLE LICENSEES:

WALLACH BROTHERS.

57 GRACECHURCH ST LONDON.E.C

The "Evertrusty" Draught Indicator, also known as Jensen's Flutometer (Regd. Trade Mark),

For Retorts, especially for Retorts set on the Regenerative Principle for maintaining the desired pull or draught on the flues.

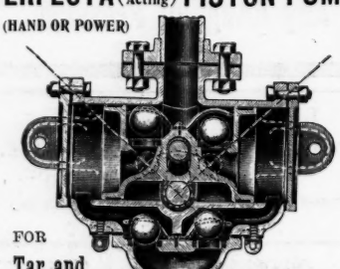
PRICE'S COKE & COAL BARROW

effects a great saving of time, labour, and expense.

For Particulars, Price, &c., apply to Mr. EDWARD PRICE, "Langley," Wykeham Avenue, WORTHING.

PERFECTA (Double Acting) PISTON PUMPS

(HAND OR POWER)



FOR Tar and Ammoniacal Liquor, &c.

Send for Illustrated Price List to the

GEORGE FISCHER STEEL & IRON WORKS, LTD.,

20, HIGH HOLBORN, LONDON.

THOMAS DUXBURY & CO.,

16, DEANSGATE, MANCHESTER.

Best Gas Coal and Cannel, giving High Illuminating Power, Large Yield per ton, and reasonable in Price.

Telegrams: "DARWINIAN, MANCHESTER."
Telephone 1806.

NEWBATTLE CANNEL.

Highest Results in Gas, & Excellent Coke.

QUOTATIONS ON APPLICATION TO

THE LOTHIAN COAL COMPANY,

LIMITED,

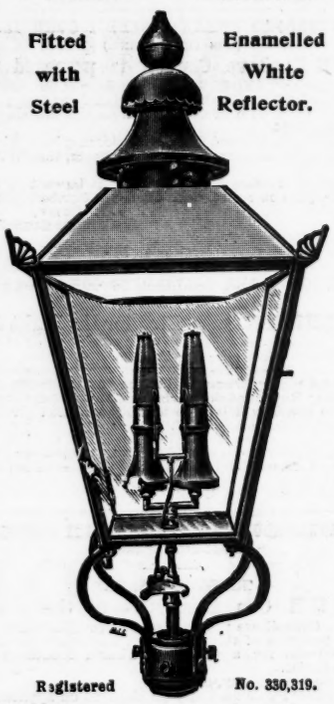
NEWBATTLE COLLIERIES,

DALKEITH, N.B.

THE "KILBURN" LANTERN.

Fitted with Steel

Enamelled White Reflector.



Registered No. 330,319.

The "Kilburn" Lantern (for double lights) and the "St. Albans" Lantern have been adopted for lighting the Town of St. Helens.

H. GREENE & SONS, Limited,

Surrey Engineering Works,

Blackfriars Road, LONDON.

Telephone 1693 HOP.

Telegrams: "LUMINOSITY LONDON."

Now Ready, pp. 584 & XVI. *251 Illustrations.* *F'Cap. Quarto, Price 18s. net (Post Free),*

THE SEVENTH EDITION OF

NEWBIGGING'S HANDBOOK

FOR GAS ENGINEERS & MANAGERS

(DEDICATED TO SIR GEORGE LIVESEY).

The Work has been revised throughout, and contains 40 pages of Letterpress and 12 Illustrations more than the last Edition.

In almost every department additions have been made; and it is believed that the labour bestowed on its production will enhance the value of the book as a Work of Reference.

Orders may be sent through any Bookseller, or direct to the Publisher,

WALTER KING, 11, BOLT COURT, FLEET STREET, LONDON, E.C.

TROTTER, HAINES, & CORBETT, LIMITED,
Brettell's Estate
FIRE-CLAY & BRICK WORKS,
STOURBRIDGE.

Manufacturers of GAS-RETORTS, GLASSHOUSE FURNACE & BLAST-FURNACE BRICKS, LUMPS, TILES, and every description of FIRE-BRICKS.
Special Lumps, Tiles, and Bricks for Regenerative and Furnace Work.
SHIPMENTS PROMPTLY AND CAREFULLY EXECUTED.

LONDON OFFICE: R. CULL, 34, OLD BROAD STREET, E.C.

Gas Companies are solicited to try Samples of the
MIRFIELD GAS COAL
UNEQUALLED.
Sperm Value 878·85 lbs. per Ton.
Prices and Analysis on application.
The MIRFIELD (GAS-COAL) COLLIERIES CO.,
RAVENSTHORPE, NEAR DEWSBURY.

HEATHCOTE GAS COAL.
Rich in Illuminating Power and yield of Gas.
Above the Average in Weight and Quality of Coke.
Maintains a High Standard in Residuals.
THE GRASSMOOR CO., LD.,
CHESTERFIELD.

ARROL-FOULIS
Patent Automatic Machinery
FOR
DRAWING AND CHARGING
GAS-RETORTS.
Full Particulars may be obtained from the Sole Makers.
SIR WILLIAM ARROL & CO., Limited,
GLASGOW.
[See Illustrated Advertisement, Sept. 6, p. 700.]

THE LARGEST INCANDESCENT MANTLE
20.000.000 YEARLY

SEND 30/-
FOR ASSORTED
SAMPLE GROSS
UNITED CHEMICAL WORKS
JULIUS NORDEN & Co
94 LEADENHALL St LONDON. E.C
20.000.000 YEARLY
MANUFACTURERS IN THE WORLD

Wrought-Iron

And Fittings & Accessories.
LAMBERT BROS., WALSALL,
MANUFACTURERS OF
WROUGHT-IRON TUBES & FITTINGS for GAS, WATER, & STEAM.
BRASS GAS-FITTINGS GAS-VALVES STEAM & WATER VALVES TOOLS. &c. AND OF
WARNER'S PATENT MARKET GAS STAND-PIPE.
LONDON: LAMBETH BRASS & IRON CO., LTD., 91 & 93, SOUTHWARK ST., S.E.

MOBBERLEY & PERRY
Stourbridge,
Are being entrusted with **LARGE REPEAT ORDERS** for
Home and Abroad for INCLINED and HORIZONTAL RETORTS
CONSEQUENT UPON THE "A1" QUALITY THEY SUPPLY.

WILSON CARTER & PEARSON
LIMITED,

GAS COAL AND CANNEL FACTORS,

Supply to any Railway Station, or for Export, all kinds of Fuel for Gas and Other Purposes.

ADDRESS CHIEF OFFICES:

Temple Buildings, 50, New Street, Birmingham.

THE THAMES BANK IRON CO.

UPPER GROUND STREET, LONDON, S.E.

SUPPLY FROM STOCK

CAST-IRON RETORTS

AND ALL KINDS OF GAS-WORKS APPARATUS.

SOCKET-PIPES FOR GAS OR WATER PURPOSES.
FLANGE PIPES FOR STEAM.

Sole Manufacturers of **LYON'S "PATENT" GAS-MAIN SYPHONS.**

AGENTS FOR

ATTERTON'S PATENT APPARATUS for CHARGING RETORTS.

STARTLING INVENTION!

Carborundum Bricks, Carborundum Crucibles, &c.

DR. ENGELS' PATENT **CARBORUNDUM COATINGS**

For Lining **GAS-GENERATORS.**

For Lining and Repairing **GAS-RETORTS.**

For Metallurgical and Chemical purposes, Furnaces, and Firing Plants of all kinds.

The Fire-Proof Products Co., Ld.

Representative: **Richard Cremer,**

CIVIL ENGINEER, WOODHOUSE LANE, **LEEDS.**

THE LEEDS FIRECLAY CO., LTD.

JOSEPH CLIFF & SONS' BRANCH.

Cliff's Wortley Silica Bricks.

FOR Arches and Crowns where high heats are required. They contain over 90 per cent. of Silica, and are nearly stationary under the influence of heat, swelling a little rather than contracting. They are not like a Gannister or Dinas Brick, but a Fire-Brick of a highly Silicious nature.

Cliff's Wortley Aluminous Bricks.

THESE are for Side Walls where great wear and tear takes place. Are made of a specially prepared mixture, are high in Alumina, and are what is termed a HARD FIRE-BRICK.

BALTIC WHARF, WATERLOO BRIDGE, LONDON, S.E.

Liverpool: Leeds Street. Leeds: Queen Street.

"VERITAS" MANTLES

Are Manufactured from **Ramie-Fibre**—much stronger than the Ordinary Cotton basis. They do not buckle under the Bunsen Flame, but offer the whole of their surface for the conversion of heat into light.

Illuminating power maintained for over 500 hours without material decrease.

EACH MANTLE EXAMINED AT THE WORKS BEFORE PACKING TO ENSURE PERFECTION.

Largely adopted by Gas Companies, Railway Companies, Lighting Authorities, &c., owing to their uniform high quality.

List and Samples free on application.

FALK, STADELMANN, & CO., LIMITED,

"VERITAS" LAMP WORKS,

83, 85, & 87, FARRINGDON ROAD,

LONDON, E.C.

THE EVESON COAL & COKE Co LP

Telegrams,
EVESON, BIRMINGHAM.
Telephone No 815.

134, EDMUND STREET,
Birmingham

INSTALLATIONS AT THE GAS-WORKS OF—

West Bromwich, Ilford, Tipton, Bilston, Cleethorpes, Rushden and Higham Ferrers, Barking, Ilfracombe, Cape Town, Erfurt, Pfortsheim, Iserlohn, Barmen-Rittershausen, Mülheim a.d. Ruhr, Nürnberg, Plauen, Rome, Lyons, Gijon, Brummen, Osterfeld, Warstein, Wiborg.

HIGHEST EFFICIENCY.
GREATEST ECONOMY.

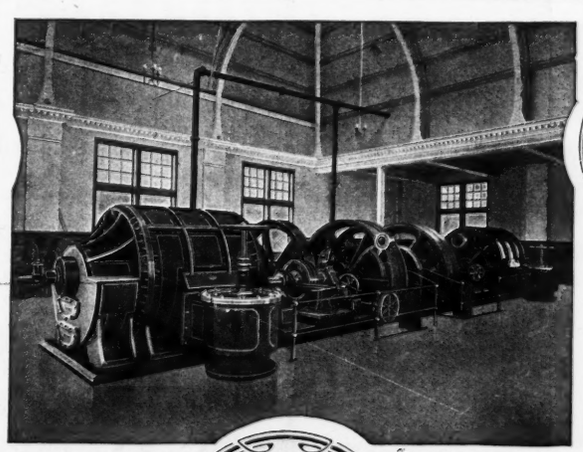
THE DELLWIK-FLEISCHER WATER GAS PROCESS.
PATENTS IN ALL COUNTRIES.
BLUE WATER GAS, CARBURETTED WATER GAS.

COMBINED WITH
SELF-CARBURETTING
AT

Imperial Continental Gas Association, Mariendorf-Berlin, Königsberg, Remscheid, Ludwigshafen, Güstrow, Salzwedel, Dortmund, Stuttgart, Hanau, Furth (Bavaria), Freiberg (Saxony), Osnabrück, Görlitz, Arnhem, Zutphen, Berne, St. Quentin, Barcelona, Beyrouth (Syria), Trieste.

THE
DELLWIK-FLEISCHER WATER GAS SYNDICATE
25, VICTORIA STREET, WESTMINSTER, LONDON, S.W.

R. LAIDLAW & SON,
LIMITED
GAS & WATER ENGINEERS,



SIMON SQUARE WORKS, EDINBURGH.

6 LITTLE BUSH LANE, LONDON, E.C.

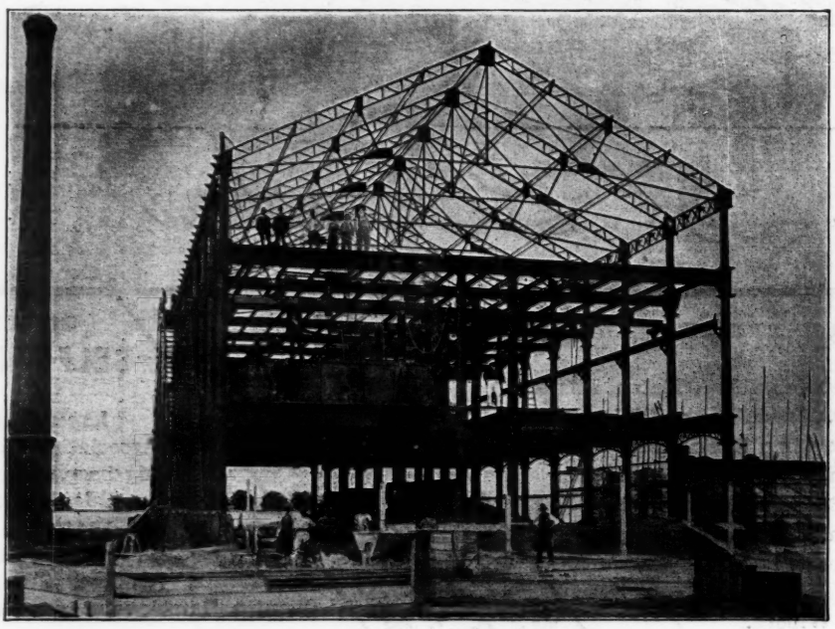
TWO EXHAUSTERS EACH TO PASS 750000 CUB. FT PER HOUR AT 60 REVOLUTIONS PER MINUTE DRIVEN BY TWO GAS ENGINES AND INTERMEDIATE FRICTIONAL GEARING, ERECTED AT GRANTON GAS WORKS FOR EDINBURGH & LEITH GAS COMMISSIONERS

ALLIANCE FOUNDRY & ENGINEERING WORKS,
GLASGOW.

THE WHESSOE FOUNDRY CO., LTD.

Works: DARLINGTON.

MAKERS OF EVERY DESCRIPTION OF GAS PLANT.



GASHOLDERS AND DRY-SEAL PURIFIERS A SPECIALITY.

PHOTO. OF STAGE-FLOOR PURIFIER-HOUSE TAKEN DURING ERECTION FOR THE UNION DES GAZ AT THEIR WORKS NANTERRE, PARIS.

London Office: 106, CANNON STREET, E.C

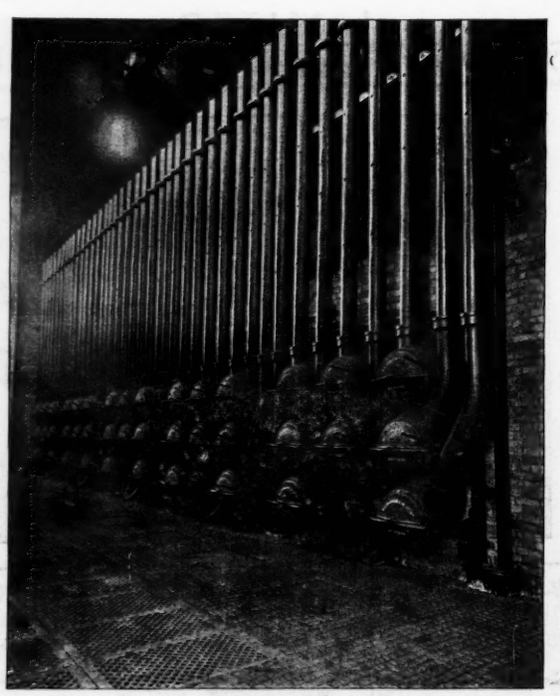
INCLINED RETORTS.

WE

make every single part of the Installation in our own Works at

RETFORD,

Including the Roofs, Coal Tippers, Coal Breakers, Coal Elevators, Coal Conveyors, Hot Coke Conveyors and Screening Plants, Retort Mouthpieces with Self-Sealing Lids, Stage Floors, Foul and Hydraulic Mains, Ascension, Arch, and Dip Pipes, &c., &c.



WE

only buy the Bricks and Raw Material. So under these conditions we have gained a

REPUTATION

for nothing but the Highest Class of Work, as can be seen in our Illustrations at Smethwick, Leek, Liverpool, Malvern, Shipley, &c., &c.

W. J. JENKINS & CO., Ltd., RETFORD.

JAMES MILNE & SON, LTD.,

GAS ENGINEERS

MILTON HOUSE WORKS EDINBURGH.

LONDON. —— LEEDS. —— GLASGOW.

THE WIGAN COAL & IRON CO., LIMTD.,

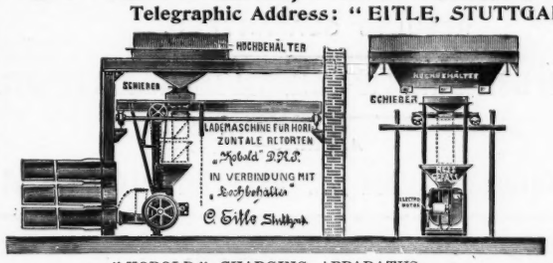
Are exclusive Owners of the well-known HAIGH HALL & KIRKLESS HALL GAS COAL COLLIERIES, and supply the Best Wigan Arley Mine Gas Coal, Gas Nuts, Gas Cannel, Cannel Nuts, &c.

MIDLAND AND WEST OF ENGLAND DISTRICT OFFICE: *6, CORPORATION STREET, BIRMINGHAM—Sole Agent: A. C. SCRIVENER.*
Telegraphic Address "WIGAN, BIRMINGHAM." Telephone No. 200.

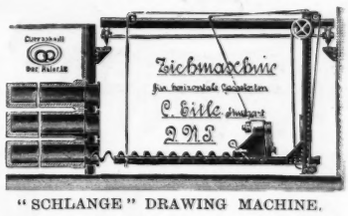
LONDON DISTRICT OFFICE: *6, STRAND, LONDON—C. PARKER & SON, Sole Agents.*
Telegraphic Address: "PARKER LONDON."

C. EITLE, ENGINEERING WORKS, STUTTGART.

Telegraphic Address: "EITLE, STUTTGART." Telephone: No. 635.



"KOBOLD" CHARGING APPARATUS.



"SCHLANGE" DRAWING MACHINE.

ADVANTAGES OF THE "KOBOLD" CHARGING APPARATUS.

1.—The simplest of all existing Charging Machines, as in charging there is only ONE shaft working.
2.—Almost indestructible in construction, as there are no combustible parts exposed to the heat of the Retorts.
3.—Uniform bed of coal of any desired height in the retort, and consequently any desired weight of charge may be inserted.
4.—Greater yield of gas in comparison with all other types, owing to the coal being deposited in the retort most advantageously.
5.—Least inrush of cold air owing to the close fit of the charging mouthpiece with the retort mouthpiece, with consequently practically no cooling of the retort, the least outrush of flame and smoke, and therefore smallest loss of gas.
6.—Smallest consumption of power.
7.—Most rapid working, as the complete charging of a retort requires only two pulls of a lever.
8.—May be set at any position in regard to height by either manual or motor power.
9.—Lowest cost to purchase; paying interest and redemption in about three years.

ADVANTAGES OF THE "SCHLANGE" DRAWING MACHINE

1.—The simplest and best drawing machine in the world for horizontal retorts.
2.—Least time required to draw a retort (10-15 seconds).
3.—Most careful treatment of the lumps of coke, as well as the retort.
4.—Smallest consumption of power.
5.—Lowest cost to purchase.
6.—Most substantial construction, and consequently very low maintenance charges.
7.—Rapid and cheap working, consequently pays interest and redemption in a few years.

G.I.C.

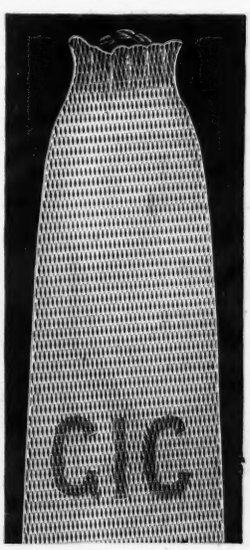
LAMPS, BURNERS, ETC.

G.I.C. Popular High Power Lamp, complete with Improved Silent Burner, price complete, 150 Candles, **16/-**; 250 Candles, **19s.**

G.I.C. High Pressure Burners from **12s.** per doz.

G.I.C. Heavy Steatite Burners, price **5s.** per doz. in gross lots.

For Lowest Prices for everything in connection with Incandescent Lighting see our New Catalogue, just published, which is a complete Buyers' Guide. Post free.



G.I.C.

IMPROVED RAMIE MANTLES.

	PRICES. BURNERS.	Per Gross.
G.I.C.	Pure Ramie Mantle for "C." .	27s.
G.I.C.	,, ,, ,, No. "2" Kern	27s.
G.I.C.	,, ,, ,, No. "3" ,,	29s.
G.I.C.	,, ,, ,, No. "4" ,,	30s.
G.I.C.	,, ,, Long High Pressure	45s.
G.I.C.	,, ,, Lucas Lamp 7s.	per doz.

No Anti-Vibrators are needed where these Mantles are used.

G.I.C. Mantles for Inverted Burners, in finest Double Woven Ramie Thread, best on the market, **45s.** per gross.

SPECIAL QUOTATIONS FOR CONTRACTS, and in 14, 21, and 100 GROSS LOTS.

SOLE MANUFACTURERS:

The GENERAL INCANDESCENT COMPANY, Ltd.,

Telegrams: "ASABLAZO, LONDON." 56, CITY ROAD, LONDON, E.C. Telephone: No. 9536 London Wall.

JOHN BROWN & CO., LTD., SHEFFIELD,

Proprietors of

ALDWARKE MAIN, CAR HOUSE & ROTHERHAM MAIN COLLIERIES, NEAR ROTHERHAM.

ALDWARKE MAIN GAS COAL

Analysis: 12,600 Feet of 19-Candle Gas per Ton.

Value in Pounds of Sperm, 820·20.

VERY FREE FROM IMPURITIES.

TELEGRAMS: "ATLAS, SHEFFIELD."

GAS — THE WINSTANLEY SPECIALTY COY. — ENGINEERS

GAS ENGINEERS.

CONTRACTORS FOR, AND ERECTORS OF, ALL GAS-WORKS PLANT.

REGENERATORS, GENERATORS, AND DIRECT-FIRED RETORTS.

RESULTS GUARANTEED.

COMPLETE INSTALLATIONS OF HORIZONTAL AND INCLINED RETORTS.

ADDRESS—

NEWTON CHAMBERS, CANNON ST., BIRMINGHAM.

D. HULETT & CO., LTD.

Show-rooms and Offices: 55 & 56, HIGH HOLBORN, LONDON.

Lamp & Meter Works: HARPUR MEWS, THEOBALD'S RD., LONDON.

MANUFACTURERS OF

OUTSIDE GAS-LAMPS

Suitable for Incandescent or Ordinary Burners.

DRY GAS-METERS, SERVICE-CLEANSERS, &c., &c.

PRICE LISTS ON APPLICATION.

HANNA, DONALD, & WILSON,

(Established 1851),

GAS ENGINEERS & CONTRACTORS,

ABERCORN FOUNDRY AND ABBEY WORKS,

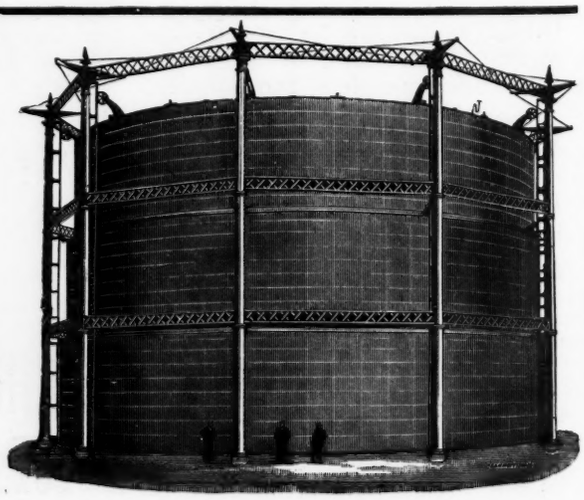
PAISLEY, N.B.,

MAKERS OF

Gasholders & Gas Plant

OF EVERY DESCRIPTION.

Telegraphic Address: "Donald, Paisley."



"SELAS" LIGHT.

Compressed Air and Gas, Consumption of Gas Reduced to a Minimum.

THE HIGHEST RESULT YET ATTAINED IN GAS LIGHTING.

45 Candles per foot of Gas.

50 PER CENT. SAVING IN GAS CONSUMPTION AS COMPARED WITH THE WELSBACH LIGHT, CANDLE-POWER FOR CANDLE-POWER.

Any Candle Power, from 30-Candles to 2500-Candles, can be obtained with the same amount of economy.

RESULTS GUARANTEED.

TESTIMONIAL. *May 11th, 1904.*

The economy in gas used in the workroom and warehouse, comparing the quarters ending March, 1903, with March, 1904, was as follows:

Gas Account, March, 1903	£12 11 8
,, ,, March, 1904 (Selas)	3 16 3
Saving	£8 15 5

Besides the economy in the gas consumption, the purity and coolness of the atmosphere is even of greater importance. Previously to the installation our people suffered headaches, although the workshops are well ventilated; but under the "Selas" plan, the workpeople have enjoyed better health, and better work is produced. After six months trial of the "Selas" light, we feel sure that its merits will ensure it a permanent success.

We shall be pleased to answer any inquiries, and you are at liberty to publish these results.

(Signed) NICHOLSON & CO., Cloth Proofing Works, St. Albans, Herts.

ALL INQUIRIES TO BE ADDRESSED—

Messrs. BEVER & WOLF, 46, VICAR LANE, BRADFORD.

1 Cubic Metre of Gas per 0·5 Kilogramme of Coke!

Both Oil-Carburetted & Benzol-Carburetted Water Gas in the same Generator.

CARBURETTED WATER-GAS PLANT

(STRACHE SYSTEM).

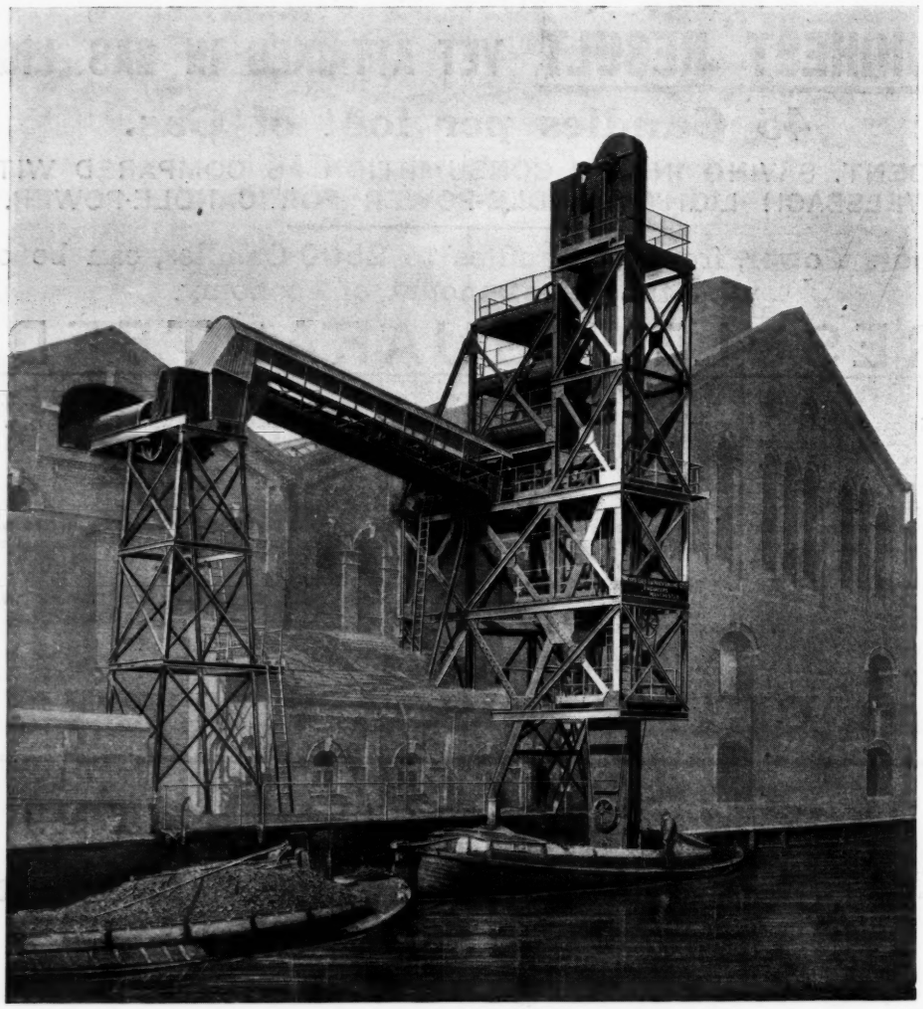
For Prices and full Particulars, apply to the

Internationale Wassergas A.G., Vienna, Austria.

Telegrams: "STRACHEGAS, VIENNA."

WEST'S GAS IMPROVEMENT CO., LTD.,

GAS AND GENERAL ENGINEERS.



PHOTOGRAPH SHOWING

West's Coal Handling Plant for unloading Barges, Elevating, Breaking, Automatic Weighing, Conveying, and Storing the Coal in Stores.

STOKING MACHINERY SPECIALISTS

Over 140 Installations of West's Stoking Machinery now at work.

West's Patent Coke-Conveyors.
,, ,, Regenerator Settings.
General Structural Ironwork.

The Bournemouth Arch-Pipe.
Belton's Relief Apparatus for Hydraulic Mains.

ADDRESS—ALBION IRONWORKS, MILES PLATTING, MANCHESTER.

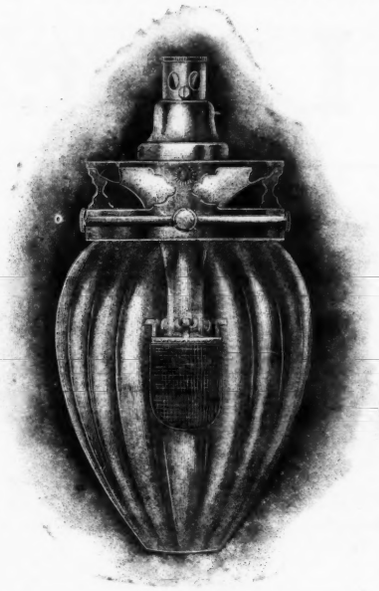
Telegrams: "STOKER, MANCHESTER." **Telephone Nos, 1339 & 5520.**

THE ORIGINAL NEW INVERTED INCANDESCENT GAS-BURNERS

BRITISH MANUFACTURE.

INCREASED DISCOUNTS TO THE TRADE.

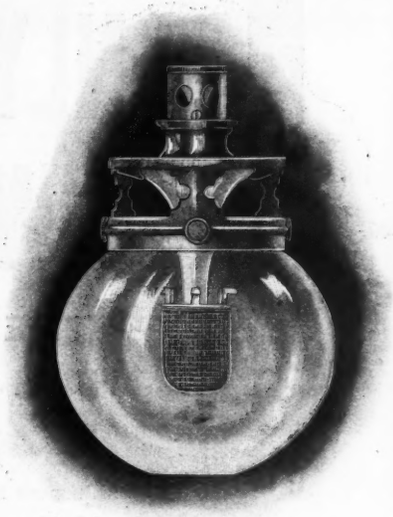
New types of BURNERS at popular Prices for the coming Season.



MAXIMUM LIGHT WITH MINIMUM CONSUMPTION OF GAS.

The "Bijou" Burner in clusters for interior lighting has the decorative effect of Electric light at One-Eighth the cost.

NEW LISTS NOW READY.



No. 2 Burner only, in Polished Brass or Steel Bronze, 4s. 6d. Globes from 6d. each. Mantles 7s. per dozen.

No. 3 "Bijou" Burner only, in Polished Brass or Steel Bronze, 3s. Globes from 4d. each. Mantles 6s. 6d. per dozen.

ONLY ADDRESS: **THE NEW INVERTED INCANDESCENT GAS LAMP CO., LD.,**
23, FARRINGDON AVENUE, E.C.

JÄGER'S PATENT GRIDS

APPLICABLE TO EVERY KIND OF PURIFIER.

This System is in successful operation at a very large number of important Gas-Works on the Continent, and orders have been received from English Engineers as follows:—

			ft.	ft.	ft.	in.	
CHESTER	1	PURIFIER	24	× 22 ×	5	3	J. C. BELTON, Esq.
ROCHESTER	4	,,	20	× 20 ×	5	6	J. VEEVERS, Esq.
ROCHESTER 2nd ORDER	2	,,	24	× 20 ×	5	0	,,
SOUTHEND	2	,,	20	× 15 ×	4	6	F. CLARK, Esq.
HULL	2	,,	20	× 20 ×	5	0	J. HOLLIDAY, Esq.
BRENTFORD	1	,,	20	× 30 ×	7	0	J. HUSBAND, Esq.
WINCHESTER	4	,,	15	× 15 ×	6	0	Messrs. C. WOODALL & SON.
CAGLIARI	4	,,	10	× 10 ×	4	0	S. SIMMELKJER, Esq.
HALSTEAD	4	,,	9	× 9 ×	5	0	J. T. JOLIFFE, Esq.
DEAL	1	,,	10	× 10 ×	4	6	J. KIRKHAM, Esq.
LEAMINGTON	1	,,	20	× 20 ×	5	0	T. BERRIDGE, Esq.
OLDHAM	4	,,	20	× 20 ×	4	0	A. ANDREW, Esq.

Full Particulars, Estimates, Models, and Records on application to Sole Licensees and Manufacturers:

SAML. CUTLER & SONS, MILLWALL, LONDON.

No. 168.

AMIDST THE HOSTS

REMEMBER

THERE IS

ONLY ONE "WIS"

THE REAL HIGH-POWER **LAMP**

which gives satisfaction Indoor and Outdoor. 700 and 400 c.p.

POND & CO.,

62, Farringdon St., London, E.C.

MECHANICAL COAL HANDLING PLANTS

OF ANY MAGNITUDE

MADE AND ERECTED

BY

GIBBONS

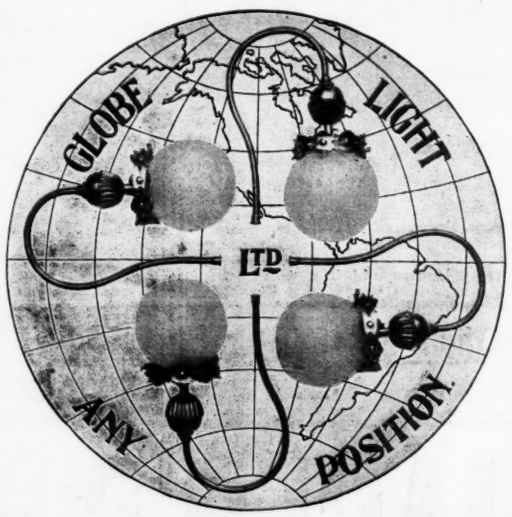
BROTHERS

LTD

DUDLEY & LONDON

Globe Light.

An Ideal Inverted Incandescent Gas Burner for the Shop, the Office, and the Home.



AN INVERTED OR INCLINED INCANDESCENT GAS BURNER OF REAL MERIT. SATISFACTORY IN EVERY RESPECT.

No Smell or Smoke. Complete Combustion.
Economical in respect to Gas and Mantles.

Just the Burner wanted for Strong Downward Illumination.

CAN BE EASILY AFFIXED TO EXISTING BRACKETS, &c.

The Managing-Director of The Electrophone, Ltd., writes:

"As the lighting of our building is I consider the most effective in the Italian Exhibition, the smallness of the cost is amazing."

GLOBE LIGHT, LIMITED,

20, Regent Street, Waterloo Place,

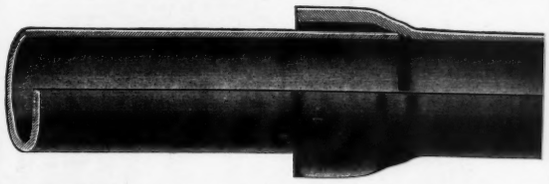
LONDON, S.W.

BOWENS' Ltd. Successors,
STOURBRIDGE.

MANUFACTURERS OF
BEST FIRE-BRICKS; INCLINED, HORIZONTAL, and SECTIONAL RETORTS LUMPS, TILES, &c., of every description.
ESTABLISHED 1860.

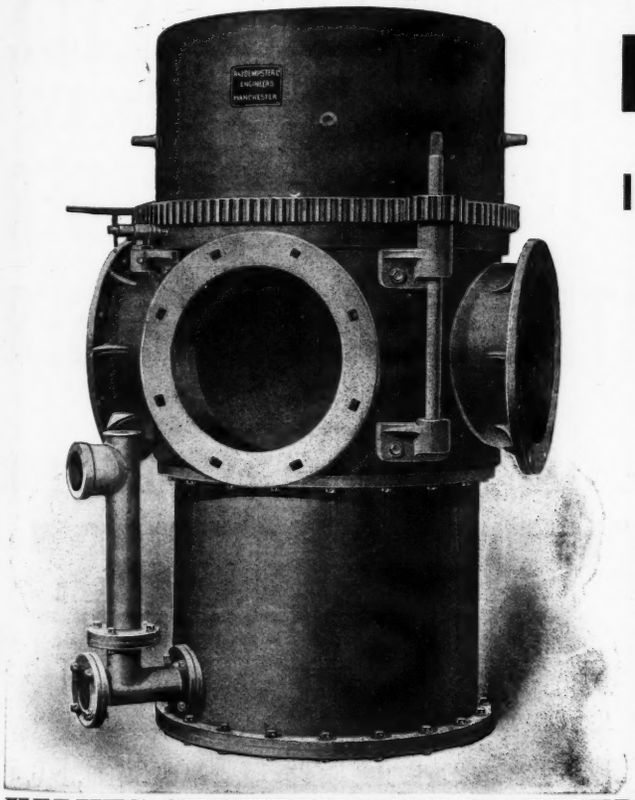
CLAYTON SON & Co LTD LEEDS
MAKERS OF THE LARGEST GASHOLDER IN THE WORLD ALSO
THE ORIGINAL MAKERS OF
SPIRAL GUIDED GASHOLDERS
MAKERS OF ALL KINDS OF STRUCTURAL IRON & STEEL WORK. STEEL FRAMED BUILDINGS ROOFS RETORT FITTINGS PURIFIERS RETORT LIDS ANTIFREEZERS for Gasholders
STEEL TANKS
OF ALL SIZES
MAKERS OF THE LARGEST IN
THE WORLD.
GASHOLDERS
OF EVERY DESCRIPTION & SIZE
HIGH CLASS BOILERS FITTED WITH CORRUGATED FLUES.
DEIGHTONS
Telegrams "GAS LEEDS." London Office 60 Queen Victoria St E.C.

MANNESMANN

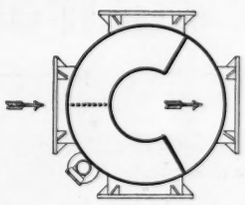


WELDLESS STEEL SPIGOT AND FAUCET PIPES
In any Length up to 40 feet for
GAS & WATER MAINS.
A PERFECT SUBSTITUTE FOR CAST-IRON MAINS.
— THE —
BRITISH MANNESMANN TUBE Co.,
— LIMITED, —
110, CANNON STREET, LONDON, E.C.

R. & J. DEMPSTER, LTD., GAS PLANT WORKS,
MANCHESTER.



IMPROVED FOURWAY
BYE-PASS VALVES.



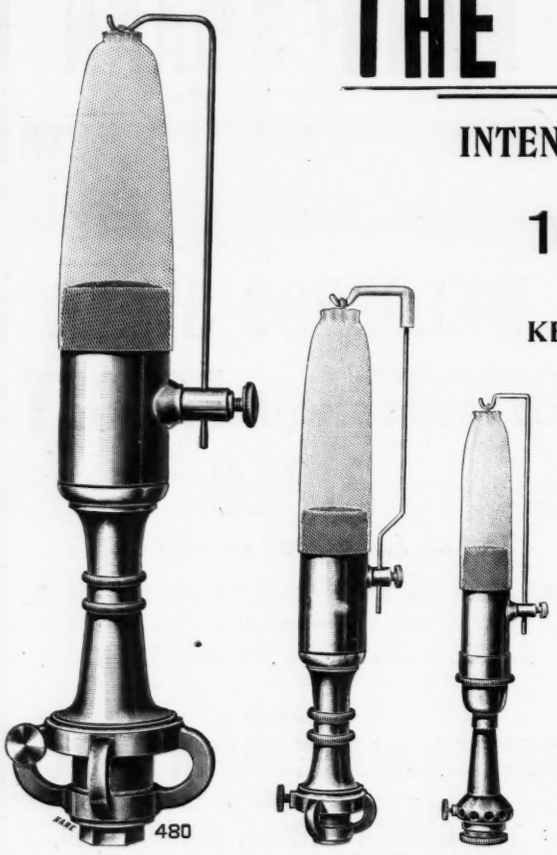
Two of these Valves controlling Two Purifiers enable either to be worked first or last and either one or both to be bye-passed.

These Valves are specially suitable for reversing the flow of Gas in Condensers.

VALVES OF EVERY TYPE SUPPLIED.

Prices and Particulars on application.

THE KEITH LIGHT.



1000 c.p. 300 to 500 c.p. 150 to 250 c.p.

INTENSIFIED INCANDESCENT GAS.

1600 INSTALLATIONS NOW IN USE.

KEITH'S PATENT BURNERS are made in various sizes up to 1000 c.p.

MAINTAINED AT A MINIMUM COST.

Perfect Air-inlet Adjustment.

Patentees and Manufacturers:

JAMES KEITH & BLACKMAN CO., LTD.,

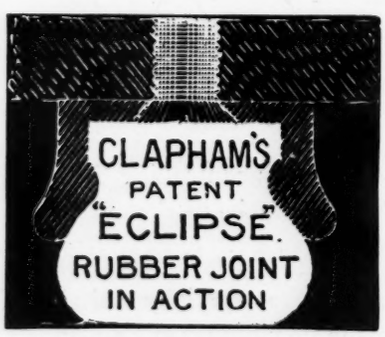
27, FARRINGDON AVENUE, LONDON, E.C.

CLAPHAM BROS. LTD., KEIGHLEY.

ESTABLISHED OVER 60 YEARS. SOLE MAKERS OF

Laycock & Clapham's Patent **"ECLIPSE" WASHER-SCRUBBER**

Clapham's Patent **"ECLIPSE" WATER-TUBE CONDENSER**



CLAPHAM'S NEW CENTURY COVER WITH PATENT

RAPID AUTOMATIC FASTENERS FOR DRY LUTE PURIFIERS.

Makers of all Ironwork **for Carbonizing Plants, for Inclined or Horizontal Systems, Valves, Mains, Lamp-Columns, Tanks, &c.**

London Representatives: Messrs. JONES & YOUNGER, Chesterfield House, 98, Gt. Tower Street, E.C.

Printed for WALTER KING by King, Sell, & Olding, Ltd.; and Published by him at 11, Bolt Court, Fleet Street, in the City of London.—Tuesday, Sept. 20, 1904.